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E-mail : ajanta1977@gmail.com, www.ajantaprakashan.com

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1. Impact of Azadirachtaindica (Neem) on Female Reproductive Organs of the Grasshopper, (Poecilocerus Pictus)

Dr. S. S. Gupta
Dept. of ZoologyAmolokchandMahavidyalaya, Yavatmal.
Dr. P. W. Chaudhari
Dept. of Zoology Govt. Vidarbha Institute of Science and Humanities Amravati.

Abstract

Adult female grasshopper *Poecilocerus pictus* were selected and feed with leaves of *Azadirachta indica*. Effects on Oogenesis and fertility were observed in female reproductive organs ovaries in broad. An adult female shows changes like degeneration of cytoplasm, appearance of vacuoles with separation of its internal layers. Treated oviduct showed increased Secretary Activity and folded epithelium. Vacuolization and separation of vaginal layers was also the prominent effect of treatment on vagina. The effects were more prominent with prolonged treatment.

Keywords:-*Azadirachtaindica,* Degeneration, Oogenesis, *Poeciloceruspictus,* Vacuolization.

Introduction

Humans coexistence with more than one million kinds of insects, many of which are pest. Insect occupy an important place in animal kingdom as 70% of its species included in class insect. Insects are beneficial as well as harmful too. They compete with humans for food, create nuisance and destroy properties. They not only feed or damage plants and animals but also spread diseases. It has been seen that insects have very good adaptive qualities to overcome any type of environmental stress as well as resistance against the pesticides. The process of evolution of nature has also perfected insects to survive most adverse and disuse conditions. Man has been protecting plants from insects pests by applying various poisonous substances like insecticides, pesticides, but still not overcome the insect pests hence man started availing possibilities of some original compound which can be a very good eco friendly alternative. Hence impact of Neem extract on female reproduction of grass hopper has been studied.

*Azadirachta indica*has strong antifeedant activity and also disturbing moulting and metamorphosis by necrosis in the epidermis. Tetranotripenoid, isolated from Neem trees has potent antifeedent, repellent and growth inhibitory activity (Zanna, et al 1974, Kraus,et al 1987). Its effect on reproduction also includes like non reorganization of sex pheromone, fail to copulate, do not lay normal number of eggs with less percentage of hatching. Hence it can be used as effective sterility.

Material and Methods

The grasshopper, *Poeciloceruspictus*is a manipulatephytophagus insect feeding voraciously on the leaves of various crops. The adult grasshoppers were collected from around Yavatmal City and were maintained in laboratory in plastic cages. They were supplied with fresh calatropis leaves on which they feed normally. Three groups of grass hopper were forcibly fed on the leaves of Neem tree, Azadirachtaindica. Initially they refused to feed but after starvation they feed to some extent on this diet. After two, four and seven days of feeding the grasshoppers were scarified and dissected in insect ringer. A fourth group of grasshopper feeding upon normal diet (Calatropis leaves)served as a control. The organs like ovary, oviduct andvagina were removed and fixed in Bouin'spicro formal acetic fluid for 24 hrs and the excess of picric acid was removed with dilute lithium carbonate solution. The material was then dehydrated by passing in ascending series of alcohol followed by xylene and then embedded in paraffin wax and prepared for sectioning. Transverse sections were cut at a thickness of 6-7 microns and stained with the differential double stain, hematoxylene and eosin. The section was observed under microscope and comparison was made between the control and the treated tissues.

Result

The observations of female reproductive organs viz. ovariols, oviduct and vagina of the grasshopper, *Poecilocerus pictus*were made. The changes in the histological structure of the organs in the azadirachtin treated grasshopper were determine after comparing with the histological details of the same organs of the controlled grasshopper.

1) **Histology of Ovariole: -** (Fig 1 plate A)

Each Ovariole has a wall made from two layers, outer Ovariole sheath band inner tunica propria. The Ovariole sheath is a cellular network of modified fattly tissue. Tracheoles are frequently present in it. The ovarioles are panoistic in nature as there are no special nurse cells

are found. The tunica propria is an elastic membrane containing fine fibrils. It has supporting function.

1.1) **Histopathology of Ovariole:-** (Fig 1.1, Fig 1.2 & 1.3 Plate A)

Few changes appear in the structure of Ovariole like degeneration of cytoplasm, appearance of vacuoles into the cytoplasm and detachment of the outer layers. These changes are more pronounced at the 7 day of azadirachtin feeding.

2) **Histology of oviduct:-** (Fig 1 Plate B)

The wall of the oviduct has a single layer of cubical or columnar cells based up on basement membrane. A peritoneal coat made up of connective tissue bound the oviduct from outside. The epithelial cells are glandular in nature due to ectodermicorigin. Oviduct has a very thin layer of cuticle from inside. There is thin layer of muscle present outside the epithelial layer.

2.1) **Histology of oviduct:-** (Fig 1.1 Plate B)

The secretary activity found to be increased due to azadirachtin influence. This was confirmed by presence of dark stained granules in the cytoplasm of the epithelial cells. Folding of the epithelium as observed as the days of exposure prolonged, but it is not so conspicuous at seven days of exposures.

3) **Histology of Vagina: -** (Fig 1 Plate C)

Vagina has cuticular lining from inside with a layer of columnar epithelium base with basement membrane. It is developed by the continuation of the genital chamber with the oviduct. The muscle layer having circular and longitudinal muscles. The outer covering is made from delicate structuereless connective tissue sheath called peritoneal membrane.

4) **Histopathology of Vagina:-** (Fig 1.1 , Fig 1.2 and 1.3 Plate C)

The histological structure of vagina of the grasshopper, *Poecilocerus pictus* seems to be altered due to the feeding of the leaves of *Azadirachta indica*. Thinning of muscular layer, degeneration of epithelial cells, increased inner lumen; vacuolization and separation of the layer are prominent features.

Discussion

In present study search for new compound of natural plant is treated as Neem to isolate its effect and accumulation of these toxic compounds into bodies of target aswell as non target organisms.

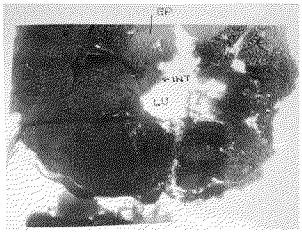
Synthetic chemicals like insecticides, herbicides, weedicides,molluscides etc. are being constantly used in the field of agriculture, so as to control the pest population, their by increasing the yield. These compounds alter physiological processes by inducing histopathological changes in the affected organisms.

The Neem plant has two main triterpenoids, azadirachtin ($C_{35}H_{44}O_{16}$) and miliantriol ($C_{30}H_{50}O_5$)having insecticidal, insect repellent and growth inhibitory activities by interfering behavior, feeding, metamorphosis, reproduction, chitin biosynthesis and the release of neurosecratory material (Schmutterer et al. 1983; Rembold 1989; Jeyaranjan et al 1990; Banerjee and Rembold, 1992; Banerjee et al 1992; Banarjee1995; Grover and Deshmukh, 1995).

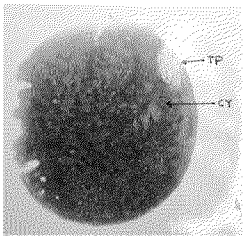
Histopathological and histochemicals observations from the female reproductive organs of the grasshopper, after treating with chemosterilant were made by saxena and aditya (1974) and found the changes in the distribution nucleic acids, phospholipids and phosphotases. Salma et al. (1976), have reported the changes in chitin synthesis qand spermatogenesis in Porthetriadispar ,Lymantriamonicha and Bormiabistortata, after treating with moulting inhibitor dimilin. Salma (1976) further reported that the chemosterilantthiotepaaffectes spermatogenesis and spermatogenic changes in dispar.

Observations

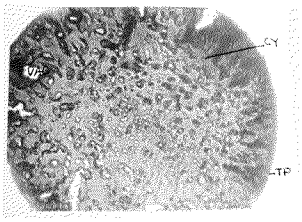
Plate A



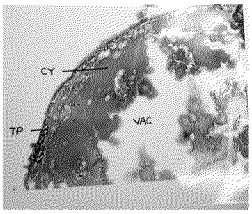
T. S. of normal ovariole



T. S. Of ovariole after 2 days exposure

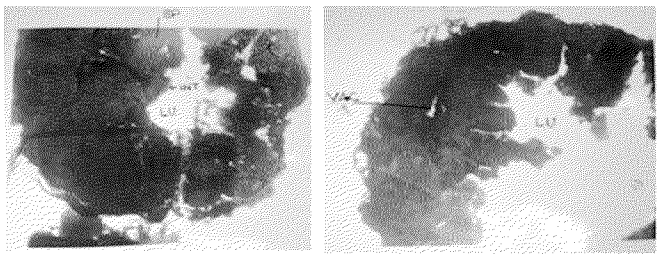


T. S. Of ovariole after 4 days exposure



T. S. Of ovariole after 7 days exposure

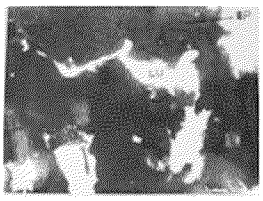
Plate B



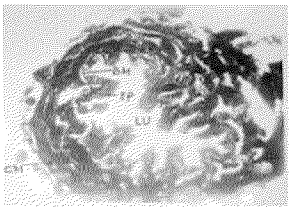
T.S. Oviduct control

T.S. Oviduct 7 days Exposure

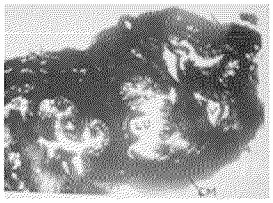
Plate C



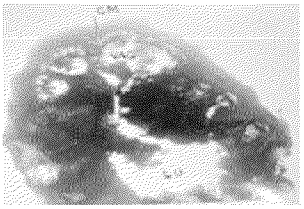
T.S. Vagina Control



T.S. Vagina 2 days exposure



T.S. Vagina 4 days exposure



T.S. Vagina 7 days exposure

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2. Impact of Some Ecological Factors on the Roaming behavior of Noctural Fauna of Painganga Sancutry

Dr. D. V. Tayade
Dr. D. S Dabhadkar
Dr. M. N. Chede
Kirankumar N. Gawai

Abstract

Ecological factors applied in the present investigation were temperature, water and food. It was found that there was huge impact of these factors on the roaming behavior of choosen seven nocturnal wild animals.

During Summer intense light and heat and scarcity of water, it was found that romaing behavior of the animals get unrestricted and more number of animals found to be moved towards water resources, whereas during rainny reason, monsoon roaming behavior get restricted and less numbers of animals moved towards water resources. During winter roaming behavior was found to be moderate as there was pleasant atmosphere.

Keywords :- Painganga sanctuary, Sondhabi circle, wild life range forest Nanded, roaming behavior, wild fauna and water resources.

Materilas and Methods :- The research area choosen for the present investigation were water resources points of wild life range forest Nanded with Sondhabi circle of Painganga Sanctuary.

Impacts of Parameters of ecological factors studied were light, temperature and water in summer, monsoon and winter. The site choosen was Sondhabi circle which was divided into nine bits namely East, Paroti One, East Paroti Two, Ekamba One, Ekamba Two, West paroti, Murli One, Murli Two, South Sondhabi and Murli Three. Water resources sites used were ditches, solar pumps and hand pumps.

Monthly observations were made on the roaming behavior for a year 2017 & 2018.

The modern devices used were camera, Telescope & voice recorder. Collected data were presented in tabulation form after making thorough observations for a year.

Results and Discussions

Roaming behavior of seven wild animals were investigated during the period of a year. It was found that noctural animals namely *Panthera pardas* (Bibat), *Ursus tibetanus*

(Bear), *Suss crofa* (wild pig), *Cuona pinus* (wild dog) , *Bosela phustragocamelus* (Blue bull), *Vulpes vulpes* (Fox), and *Canis lupus* (wolf) revealed unrestricted roaming behavior in summer, restricted behavior in monsoon and moderate roaming behavior in winter. These animals revealed fearless roaming for water and food and roam in more number towards the water resources during summer, as there was scarcity of water in the remained part of sanctuary. In monsoon roaming behavior was restricted towards the choosen water resources as ample of water and food is available in the remained part of sanctuary. Where as in winter moderate numbers of animals get attracted towered the water resources as some other water resources were found to be still available in the remained part of the forest.

Table -1 Observations of roaming behavior of wild nocturnal animals in wild life range forest at Sondhabi Circle during year 2017-18

(Average result of four observations per month)

Name of animals * scientific names of animals were mentioned in results and discussions.

Month & season	Name of beats	Name of animals *							Total No animals spotted
		Bibat 1	Bear 2	Wild pig 3	Wild Dog 4	Blue Bull 5	Fox 6	Wolf 7	
Summer									
Febuary 2017	East – Paroti 1	2	2	7	5	2	3	-	82
	East – Paroti 2	1	-	4	1	3	2	2	
	Ekamba -1	1	1	-	2	-	2	2	
	Ekamba -2	-	1	2	1	-	-	-	
	West paroti	-	1	-	-	1	-	-	
	Murali -1	-	1	-	-	-	2	1	
	Murali -2	2	1	6	2	-	2	1	
	Sondhabi	1	1	6	2	-	2	1	
	Murali -3	1	1	3	1	-	-	-	
Summer									
March 2017	East – Paroti 1	-	-	2	-	1	1	1	51
	East – Paroti 2	2	-	-	2	-	1	1	
	Ekamba -1	-	-	-	5	-	1	1	
	Ekamba -2	-	1	2	1	1	1	1	
	West paroti	-	1	2	1	1	1	1	
	Murali -1	2	-	3	1	1	1	1	
	Murali -2	-	-	2	-	-	-	-	
	Sondhabi	3	1	1	-	-	-	-	

	Murali -3	-	-	2	1	-	-	-	
Summer									
April 2017	East – Paroti 1	2	-	3	1	1	1	1	29
	East – Paroti 2	-	-	2	-	-	-	-	
	Ekamba -1	2	-	-	-	1	-	-	
	Ekamba -2	-	-	1	1	-	1	1	
	West paroti	1	-	1	1	-	1	1	
	Murali -1	1	1	-	-	-	-	-	
	Murali -2	-	-	1	-	-	-	-	
	Sondhabi	-	-	1	-	-	-	-	
	Murali -3	-	-	1	-	-	1	-	
Summer									
May 2017	East – Paroti 1	-	-	2	1	2	1	1	23
	East – Paroti 2	-	-	-	3	-	-	-	
	Ekamba -1	-	-	-	1	1	-	1	
	Ekamba -2	1	-	1	1	-	-	-	
	West paroti	1	1	-	-	-	-	-	
	Murali -1	-	-	-	-	1	1	-	
	Murali -2	-	-	-	1	-	-	-	
	Sondhabi	-	1	-	-	-	-	-	
	Murali -3	-	-	-	-	1	-	-	
Mansoon									
June 2017	East – Paroti 1	2	1	-	-	1	-	-	11
	East – Paroti 2	1	-	1	1	-	-	-	
	Ekamba -1	-	-	-	-	-	-	-	
	Ekamba -2	-	-	-	-	-	-	-	
	West paroti	1	-	-	-	-	-	-	
	Murali -1	-	-	-	-	-	-	-	
	Murali -2	-	-	-	-	-	-	-	
	Sondhabi	-	-	-	-	1	-	-	
	Murali -3	-	-	1	-	-	1	-	
Mansoon									
July 2017	East – Paroti 1	-	-	3	-	-	2	-	25
	East – Paroti 2	1	-	1	2	1	1	2	
	Ekamba -1	-	-	-	-	-	1	-	
	Ekamba -2	1	-	-	-	-	-	-	
	West paroti	1	1	1	-	-	-	-	

	Murali -1	1	-	-	1	-	-	-	
	Murali -2	-	-	-	-	-	-	-	
	Sondhabi	1	-	-	-	1	-	1	
	Murali -3	1	-	-	-	1	-	1	
Mansoon									
	East – Paroti 1	1	-	-	-	-	-	1	
	East – Paroti 2	-	-	1	-	1	-	2	
	Ekamba -1	-	1	-	-	-	-	-	
	Ekamba -2	-	-	-	1	-	-	-	
	West paroti	-	-	-	-	-	-	-	11
	Murali -1	-	-	-	-	-	-	-	
	Murali -2	1	1	-	-	-	-	-	
	Sondhabi	1	-	-	-	-	-	-	
	Murali -3	-	-	-	-	-	1	-	
Mansoon									
Sep 2017	East – Paroti 1	-	1	1	-	-	1	-	
	East – Paroti 2	1	-	-	2	-	-	-	
	Ekamba -1	-	-	-	-	-	-	-	
	Ekamba -2	-	-	-	-	2	-	-	
	West paroti	-	-	-	-	-	-	1	13
	Murali -1	1	-	-	-	1	-	-	
	Murali -2	-	1	-	-	-	-	-	
	Sondhabi	-	1	-	-	-	-	-	
	Murali -3	1	-	1	-	-	-	-	
Winter									
Oct 2017	East – Paroti 1	1	1	-	-	-	-	-	
	East – Paroti 2	-	-	-	-	-	-	-	
	Ekamba -1	-	-	-	-	-	1	-	
	Ekamba -2	-	-	1	-	-	-	-	
	West paroti	-	-	-	3	2	-	1	16
	Murali -1	-	-	-	-	-	-	-	
	Murali -2	-	4	-	-	-	-	-	
	Sondhabi	-	-	-	-	-	-	-	
	Murali -3	-	1	-	-	1	-	-	
Winter									
Nov 2017	East – Paroti 1	1	1	-	1	-	-	2	
	East – Paroti 2	-	-	-	-	-	-	-	

	Ekamba -1	-	-	-	-	1	-	1	
	Ekamba -2	-	-	-	-	-	-	-	
	West paroti	-	1	1	-	-	1	-	26
	Murali -1	2	1	1	-	-	2	-	
	Murali -2	1	1	-	-	1	-	1	
	Sondhabi	1	-	1	1	-	-	-	
	Murali -3	1	-	1	1-	-	-	-	
Winter									
Dec 2017	East – Paroti 1	1	-	-	1	-	-	-	
	East – Paroti 2	1	-	1	-	1	-	-	
	Ekamba -1	1	-	2	-	-	1	-	
	Ekamba -2	2	1	-	-	-	-	3	
	West paroti	1	-	-	1	-	1	1	37
	Murali -1	4	1	2	-	1	1	1	
	Murali -2	1	-	-	-	1	-	-	
	Sondhabi	1	2	-	-	-	1	-	
	Murali -3	1	-	1	-	-	-	-	
Winter									
Jan 2018	East – Paroti 1	2	2	1	1	-	1	-	
	East – Paroti 2	1	-	-	-	2	-	1	
	Ekamba -1	1	-	-	-	1	-	-	
	Ekamba -2	1	-	-	-	1	-	-	
	West paroti	-	2	1	-	1	-	-	27
	Murali -1	-	-	-	-	1	-	1	
	Murali -2	-	1	-	1	-	1	-	
	Sondhabi	-	-	-	2	-	-	-	
	Murali -3	-	1	-	-	-	-	-	

The present investigation on the roaming behavior of wild nocturnal animals were found to be correlated with investigation made by number of investigators. There was alteration in the roaming behavior after the change in the season revealed that the effect of modern agriculture and available food showed its impact on the movement of the animals. The effect of modern agriculture on the population reduction on wild animals (Common et.al. 1991) The present work also found to be correlated with the investigation made by Kolb(1984) and Saundersetal (1995) on the movement pattern in fox. Foxes rely heavily on roads and tracks to gain access to foreign areas (May and Norton 1996) It was also found that foxes did not favour roads and beach (Phillips and Catling 1991). Discountuious tracking (Harris et.al 1990) was conducted over

consecutive nights of twelve occasions during 1994-95. Most tracking sessions were eight hours long duration (Harris et.al 1990). Minimum convex polygon (MCP)(Southwood 1966) was selected as preferred method for determine the home range. This method produces non statically method (Swihart& Slade, 1985).

It is said that the animal behavior of roaming is constantly changing day by day as the dramatic changes in environmental factors like water and food. There is also increase in human population resulting in the shrinkage of natural areas of wild animals. In the present investigation the area chosen as a part of wild management plan artificial water holes are set up to provide water during the day season. There are no fences to said sanctuary . Hence free roaming behavior is prominent in the area. Animals found to be get adopted quickly to the changing situations. They roam in the viscinity of community. Home range size in the present investigation may vary within 250 hectars.

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3. Important Rare Ethnomedicinal Plants from Painganga Forest Range Umarkhed, District-Yavatmal, Maharashtra

Kadam Vasundhara
Deosthale Sanjay
Department of Botany, B. B. Arts, N. B. Commerce and B. P. Science College, Digras District-Yavatmal, Maharashtra, India.

Abstract

The present research work was carried out in Painganga forest range Umarkhed. Dist. Yavatmal, Maharashtra. During 2015–2017. To study the rare plants of ethnomedicinal properties, based on information obtained from tribal & rural people. The information was documented using questionnaire, personal interviews& conversation. 200 plant species with medicinal properties were collected.Critical evaluation of abundance and frequency of their distribution. We came to know that 24 important medicinal plants, which are very rare. Before the extinction of such important plants, they should be conserved. For that proper management plan is needed.

Keywords: Medicinalplants, Rare, Conservation, Painganga forest.Maharashtra.

Introduction

Globally, about 85 % of the traditional medicines used for primary healthcare derived from plant's[1].Over 7500 plant species are used by 4635 communities for human and veterinary healthcare. World Health Organization has listed over 21,000 plant species used around the world for medicinal purpose. In India about 2,500 plant species belonging to more than 1000 genera are being used in Indigenous systems of medicine. India is tenth among the plant rich countries of the world and fourth among the Asian countries[2].In view of tremendously growing world population, increasing anthropogenic activities caused rapidly eroding natural ecosystem etc. The natural habitat for a great number of plants are dwindling and of per capita consumption has resulted in unsustainable exploitation of Earth's biological diversity, exacerbated by climate change, ocean acidification, and other anthropogenic environmental impacts.[3]

Painganga forest is a rich store house of medicinal plants. Tribals in Painganga forest have great faith in effectiveness of medicinal plants.Painganga forest is located ineastern(Vidarbha) region of the Maharashtra. It is located between 19^0 36' to 19^0 7' North latitudes and 77^0 42' to $77^0$7' East longitudes. The total forest area in Umarkhed tahsil is 487 sq / km which is 39.33% of the geographical area of the tahsil. There are nearly 157 villages having about 30% population of the tribals. Tribal population mainly include Andha, Bhil , Kolam , Banjara etc. this tribal population of area has been using various plants and their part's as medicine for various human diseases. Medicinal plants are also under constant threat due to over exploitation from natural habitats in the absence of cultivation. The high anthropogenic pressures and associated fragmentation of natural forest have resulted in loss of habitat and species.[4]

Materrials and Methods

The survey was carried out during the month of January 2015 to December 2017 on visited various seasons and observed distribution of plant species. Rare plants were recorded from Painganga forest region. Information about uses of medicinal plants was collected from interviews with local medicine men and other knowledgeable elderly persons of either rural or tribal community and herbal practitioners. Whenever possible the voucher specimen were collected, processed as per routine herbarium methods ; identification of collected plants material were made either in the field itself or in laboratory following different floras,[5-6] by taxonomy experts in Department of Botany, B.P.Science College, Digras, District Yavatmal, Maharashtra.[7-9]

Result

Information of 24 medicinal plants, belong to 17 families , used commonly as remedies of various diseases are arranged in alphabetical order of their scientific name along with family, local names (Marathi) flowering and fruiting period, plant parts, Ailments, conservation status and Regeneration are tabulated below.

Table 1: List of rare important medicinal plants in Painganga forest Range.

S. no.	Botanical name/(Family)	Local name (Marathi)	Fls and Frts	Part(s)used	Ailments	Conservation status	Regeneration by
1	*Aristolochia indica* L.	Sapsand	Septembar -	Root leaves	Snake bite antidiabetic	Rare	Seed

	(Aristolochiaceae)		January				
2	*Asparagus racemosus*.wild (Asparagaceae)	Shatavari	July - September	Rhizome root	Enhance fertility promote milk production	Rare	Seed
3	*Blepharis repens* (Vahl) (Acanthaceae)	Hadsan	September - December	Whole plant	Bone fracture	Rare	Seed
4	*Caralluma adscendens*(Roxb) (Asclepiadaceae)	Muka	May-Augest	Stem leaves	Ear,toothache, cough	Rare	Seed , root
5	*Chlorophytum tuberosum* (Roxb) (Aspargaceae)	Safed musali	July - September	Root	Boost immune system, tonic for strength,arthritis	Rare	Tubers , seed
6	*Cissampelos pareira* (Lin) (Menispermaceae)	Phadvel	May – August	Root , Leaves	Dysentery, urinary, stomach troubles	Rare	Seed
7	*Citrullus colocynthis* (L) (Cucurbitaceae)	Kadu indryan	July - September	Root	Malaria fever,digestive disorder,asthma , jaundice	Rare	Tubers , seed
8	*Cleome gynandra* L. (Cleomaceae)	Pandhari tilwan	June – December	Root leaf	Diabetes, ear & tooth ache	Rare	Seed
9	*Cochlospermum religiosum*(L.) Alston (Bixaceae)	Ran ganeri	January – March	Stembark, gum	T.B, sores, cough,gonorrhea	Rare	Seed

10	*Corallocarpus epigaeus*(Rottl.) (Cucurbitaceae)	Mirchi kand	June – August	Root	Snake bite, rheumatism , chronic fever	Rare	Tubers , seed
11	*Cyphostemma setosum*(Roxb) (vitaceae)	Katekomi	Augest - November	Root	Acidity, lungs inflammation	Rare	Seed , tubers
12	*Dioscorea bulbifera* L. (Dioscoreaceae)	Jatashankar	September - February	Tuber	Acidity,sexual weaknees, skin diseases	Rare	Tubers , seed
13	*Dioscorea oppositifolia* L. (Dioscoreaceae)	Narnageli	August – October	Tuber , bulbils	Herbal tonic,poor appetite,drycough,dysentery	Rare	Tubers , seed
14	*Dioscorea pentaphylla* L. (Dioscoreaceae)	Pandhara partvel	September - December	Tuber ,root	Lactation , dengue fever, cough	Rare	Bulb,seed
15	*Gymnema sylvestre* (Retz) (Asclepiadaceae)	Aphumari safed	April – October	Root , leaves	Diarrhea fever, diabits	Rare	Seed
16	*Hymenodictyon excelsum* (Roxb) (Rubiaceae)	Bhorsalai	August – October	Stem bark , root, leaf	Ulcer, sore throat, fever , relieve thirst	Rare	Seed , root
17	*Hymenodictyon obovatum*.Wall. Roxb. (Rubiaceae)	Gidhyasag	August - October	Stem bark	Diabetes	Rare	Seed , root
1	*Iphigenia*	Ranlash	June -	Corm	Migraine	Rare	Corm ,

8	*indica* (L) (Liliaceae)	un	September	(oil)			seed
19	*Oroxylum indicum*(L) Benth (Bignoniaceae)	Tetu	February – March	Root bark, stem bark	Tonic, bonefracture	Rare	Seed , root
20	*Plumbago zeylanica* L. (Plumbaginaceae)	Chitrak	July - October	Root	Skin diseases	Rare	Seed
21	*Pterocarpus marsupium* Roxb. (Fabaceae)	Bijasal	November – March	Stem bark	Antidote on snake bite	Rare	Seed
22	*Sauromatum venosum* (Dryandex Aiton) (Araceae)	Nurki	April - May	Tuber	Scorpion sting , snake bite, piles	Rare	Tubers
23	*Tacca leontopetaloides* (L) (Taccaceae)	Pengha gra	July - September	Corm	Rheumatism , mental disorder , stomach disorder	Rare	Tubers , root
24	*Verbascum chinense* L. (Scrophulariaceae)	Kutki	February - September	Whole plant	Skin diseases , acidity	Rare	Seed , root

(Fls – Flowering , Frts – Fruiting)

Discussion

Once upon a time Painganga forest was considered to be the richest vegetation in Yavatmal district. In Ramayana it was called as 'Dandkaranya'. In which Rama and Sita were dwelt in this forest in their Vanwasa. Dr.V.N.Kadam 2002[8] cunducted Ethnobotanical survey of Umarkhed area. They have mention availability of above plant. But now, after 20 years they are very rare, if it's concentration have not been given for survival of this plant, they will soon be endangered and finally they will become extinct. So it's need to conserve wild populations without any delay .

Conservation Measures

1] Special protection should be given

2] Ban on uprooting.

3] Cultivation should be necessary in core zone of forest.

4] Conservation of seeds and propaguls.

Acknowledgement

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4. Gastrointestinal Parasites of Felis chaus (Jungle Cat) in Katepurna Wildlife Sanctuary, Akola India

Milind Shirbhate
Department of Zoology, Shankarlal Khandelwal Arts, Science and Commerce College, Akola, Maharashtra, India
Amrita Shirbhate
Head, Department of Zoology, Mahatma Phule Arts and Science College, Patur Dist, Akola, Maharashtra, India

Abstract

To study the prevalence of gastrointestinal parasites of Felis chaus, 48 scat samples were collected from Katepurna Sanctuary during the census period conducted by forest department during January 2018. Out of these 45 samples had the highest overall infection rate of Filaria felis n. sp., F. melis, Toxocara canis (nematodes), Mesocestoides sp., Taenia crassiceps (cestodes), Paragonimus sp. Echinostomatidae, Dicrocoeliidae, Pseudophyllidea, Mesocestoides sp. Hymenolepididae Acanthocephala, Spiruroidea, Gnathostoma sp. and Mixed type of infections of Ascaris sp. was found faecal samples.

The results show that 93.75% of the sample harboured either single or mixed infections with endoparasites. The prey of this cat in the sanctuary includes a wide variety of invertebrate and vertebrate preys belonging to 39 species of mammals, birds, reptiles, amphibians, fishes, insects, crustaceans, mollusks and scorpions as well as some fragments of vegetable food.

This study provided a first overview on parasites in Felis chaus in the Katepurna Sanctuary.

Keywords: Jungle cat, Felis chaus, Faecal sample, Parasite, Scat analysis.

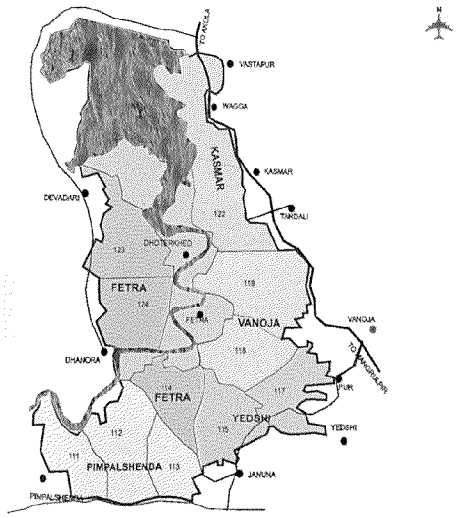
Introduction

The distribution of jungle cat is largely oriental; it occurs in the Middle East, the Indian subcontinent, central and Southeast Asia, Sri Lanka and in southern China. Jungle cat is almost always associated with water and dense vegetation, the jungle cat may be found in a wide variety of other habitats types, including deserts, where it occurs along riverbeds and near oases, and in grassland, woodland and dry deciduous forests. It is listed as Least Concern on the IUCN Red List. The jungle cat has a uniformly sandy, reddish-brown or grey fur without spots; melanistic and albino individuals are also known. It is solitary in nature, except during the mating season

and mother-kitten families. Adults maintain territories by urine spraying and scent marking. Its preferred prey is small mammals and birds. It hunts by stalking its prey, followed by a sprint or a leap; the ears help in pinpointing the location of prey. The present work designated to give an idea on endo-parasites along with some comments on the cat ecology, biology and diet utilized by this species in the Katepurna Wildlife Sanctuary.

Material & Methods

Study Area: The Katepurna Sanctuary in Akola, Maharashtra is an exotic sanctuary dotted with an abundance of flora and fauna. Positioned in Akola district in Vidarbha region of the state of Maharashtra, the sanctuary lies in close proximity to the catchments area of Katepurna reservoir (Mahan Dam). Its area is geographically located at - 20°25'0.54" N 77°10'50.14"E. The land vegetation at Katepurna Sanctuary is southern tropical dry deciduous forest. There are over 115 species of plants at this sanctuary such as Bihada, Dhawada, Moha, Tendu, Khair, Salai, Aola, Tendu, etc. Katepurna Wildlife Sanctuary is renowned for the Nilgai, Four-horned antelope and Barking deer. Other animals that can see at the sanctuary include Leopard, Sambar, Black buck, Nilgai, Wolf, Wild boar, Hyaena, Hare, Jungle cat and Monkeys. The Katepurna water reservoir attracts many water birds. The leopards are the big predator species found in the Katepurna.



Collection and examination of faecal samples: The material for this study comprises the faecal samples of Felis chaus in and around Katepurna Sanctuary. A total 26 faecal samples were collected from different locations during the census period Faecal samples were collected in (Zip-log) polythene bags in the census organized by forest department and Nisargakatta Akola.

Identification of the samples was carried out by direct sighting of the animals or on the basis of the pugmarks. Fresh samples were preferred for analysis. The polythene bags containing the faecal samples were labeled with date, time, locality (GPS provided by forest department). The bags were properly sealed and were brought to the laboratory. The size and shape of scats were also noted.

Methodology

Faeces mixed with an equal volume of 10% formalin were examined for parasite eggs, larvae, cysts, and oocysts by sugar flotation (specific gravity 1.275) (Georgi and georgi, 1990) and sedimentation with formalin-ethyl acetate (Young et al., 1979). Parasite products were measured with a microscope equipped with a calibrated eyepiece micrometer with the help of software and identified based on size and morphology. References used for identification were Agrawal et al., 1981 ; Soulsby, 1982; Beaver et al. , 1984; Patton et al., 1986; Dubey et al., 1989; and Georgi and Georgi, 1990.

Result and Discussion

After analysis of all 48 scats of jungle cat, 45 samples Filaria felis n. sp., F. melis, Toxocara canis (nematodes), Mesocestoides sp., Taenia crassiceps (cestodes), Paragonimus sp. Echinostomatidae, Dicrocoeliidae, Pseudophyllidea, Taeniidae, Mesocestoides sp. Hymenolepididae Acanthocephala, Spiruroidea, Gnathostoma sp. and Mixed type of infections of Ascaris sp. was found faecal samples.

Evaluation of Incidence : During screening the different samples were examined as per their habitat and incidence of parasitic infections and their percentage were noted. Total percent of parasitic forms found in Felis chaus were evaluated, overall percentage of parasitic infections of zoonotic importance.

The results show that 93.75% of the sample harboured either single or mixed infections with endoparasites. The prey of this cat in the sanctuary includes a wide variety of invertebrate and vertebrate preys belonging to 39 species of mammals, birds, reptiles, amphibians, fishes, insects, crustaceans, molluscs and scorpions as well as some fragments of vegetable food.

This study provided a first overview on parasites in Felis chaus in the Katepurna Sanctuary and will helpful for all forest staff to carry out further management practices.

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5. Pharmacognostic Studies of Root of Spermadictyon suaveolens Roxb A Potential Herbal Abortifacient

U. R. Kanerkar
Dept. of Botany, G. S. Tompe Arts, Commerce & Science College, Chandur Bazar, Dist. Amravati (MS)
P. Y. Bhogaonkar
Ethnobotany Laboratory, Govt. Vidarbha Institute of Science & Humanities, Amravati (MS)

Abstract

Spermadictyon suaveolens Roxb. is a branched shrub of family Rubiaceae found along roadside on hill slopes. Root infusion is given in curvature. The roots are used in diarrhoea and ulcers. Bark is ground and rubbed on the body in puerperal fever. Locally used by Korkus of Melghat for abortion. The anatomical and phytochemical study was carried out for root. Outer part of root containing part of wood phloem and cortex is used as medicine. The material was screened for 16 bioactive molecules of which present study shows presence of alkaloids, acubins, catechol, flavonones, saponins, steroids, triterpenoids, cardiac glycosides, polyoses and polyurenoids. Different ash values were estimated and ash analysis was done to study the mineral profile qualitatively. The chemical composition thus makes the drug a strong candidate for further investigations.

Keywords: Pharmacognosy, *Spermadictyon suaveolens*, Bioactive molecules, Mineral profile.

Introduction

Many tribes and villagers are relying on indigenous plant drug for their health care needs and have found a place in day-to-day life in the developing countries like India. Common peoples are attracted towards the indigenous plant medicines because of their easy availability, affordability and its trustable biosafety for health (Musmade *et al.* 2016). *Spermadictyon suaveolens* Roxb. is a branched shrub, up to 1-2 m tall commonly found in tropical and subtropical Himalaya and central India and China along roadside on hill slopes. The plant is commonly called as 'Forest Champa'. The species name *suaveolens* means sweet-scented and

refers to the fragrant flowers (www.flowersofindia.net). Roots used in diarrhoea and ulcers (Kirthikar and Basu, 1935; Jain, 1991). Root infusion is given in curvature (Chopra et al., 1996). The roots are used in treatment of diabetes and rheumatoid arthritis (Sonar, 1968). Antidiabetic effect of a root extract from *S. suaveolens* also reported by Farnsworth and Segelman (1971). Bark is ground and rubbed on the body in puerperal fever (Agrawal, 1997). Korkus of Melghat use it as a novel medicine in abortion. (Devarkar, 2001). Bark and leaves of plant shows antioxidant and antimicrobial property respectively (Ajaib et al. 2014). Stem and root are used for treating various diseases by local and tribal peoples. The traditional healers of the Maharashtra uses roots and stem for curing the diseases related to bone, wound healing, diabetes, Herpes etc. Stem was studied pharmacognosticaly by Musmade et al. (2016). Kulkarni and Sathe (2013) reported compounds like Azulene, Tetratetracontane, 9-Nonadecane, n-hexadecanoic acid, 2-methoxy-4 (1-propynyl), tritetraconatne, Ergost-5-en-3-ol, 22, 23-dimethyl-, acetate (3 β) and ß sitosterol, stigmasterol from the root of this plant. The root shows antidiabetic properties (Phatak and Prabhavalkar, 2017). It is potent antidiabetic plant and used in folk, Ayurvedic and homeopathic systems of medicine (Kapoor, 1997; Mitra, 1985). The stem bark of this plant is boiled in water and vapors are allowed over the body of a person suffering from fever and also in case of anemic persons. Active principles, medicinal properties and uses of these plants have been listed by (Mahmoodreza et al., 2010; Modupe et al., 2010 and Sirisha et al., 2011).

Material and Methods

The plants were brought to laboratory for identification and were processed for herbarium specimens. For identification and nomenclature standard floras were referred. Voucher specimens (URK 41) are submitted in the herbarium of Dept. of Botany, Govt. Vidarbha Institute of Science and Humanities, Amravati. Anatomy of the plant part used was studied after revealing the literature. For the anatomical studies fresh hand cut sections were observed under microscope. The detailed tissue study was done by studying microphotographs taken with the help of CCD camera. Detection of bioactive compounds was done by standard prescribed methods. (Anonymous, 1966, Evans 1997, Gibbs 1974, Gupta and Varshney 1997, Harborne 1973, Peach and Tracey 1979, Sadasivam and Manickam 2005, Thimmaiah, 1999). Responses to various tests were denoted by +, ++ and +++; indicating weak, moderate and strong reactions

respectively. Plant ash was prepared different ash values were calculated following (Kulkarni and Apte, 2000). Qualitative analysis was done to detect various minerals (Johanson, 1940).

Observation and Results

Morphology

A branched shrub, up to 1-2 m tall, branches divaricate. Leaves opposite, elliptic-lanceolate, 10-20 cm, velvety; petioles 1-2 cm long; stipules triangular, hairy. Flowers in many-flowered, spherical heads, arranged in panicles at the end of branches, 5-10 cm across; flowers in bunches of 5 or more. Calyx 3-4 mm long, hairy; tube very narrow and tapering, acute, pubescent. Corolla white or pale blue with a relatively long tube; tube slender, funnel-shaped, up to 1.5 cm long, with 4-5 short lobes, spreading, up to 8 mm, acute. Stamens 5, inserted at corolla throat, included. Ovary shallowly 5-lobed. Style with 5-lobed stigma protruding out of the flower. Fruit a capsule, crowned by sepals. Seeds with thin lacerate aril (Plate I)

Anatomy

Outer part of root is sliced and removed. This part contains peripheral part of wood, phloem and cortex. Anatomy of this part only is studied. Wood with vessels mostly clustered, few solitary; vessel elements angular; conjunctive tissue thick walled; rays uni to biseriate. Phloem cells thin-walled filled with contents. Outer layers of phloem get transformed into stone cells. In the pericyclic region a distinct cambium develops, it produces layers of radially elongated rectangular cells; many of the cells of this layer also become thick walled, lignified. Due to increasing pressure of xylem cylinder and tissues produced by pericyclic cambium, cells of phloem gradually get crushed. Cortical cells of old root also become comparatively thick and lignified; they also take the safranin stain indicating the thin deposition of lignin. Outer cortex collenchymatous, gets retained for long time; with growth cells get radially stretched; most of the cells show presence of brown pigment. Epidermal cells comparatively much smaller getting retained only in patches in old root (Plate II)

Plate I

Spermadictyon suaveolens Roxb.

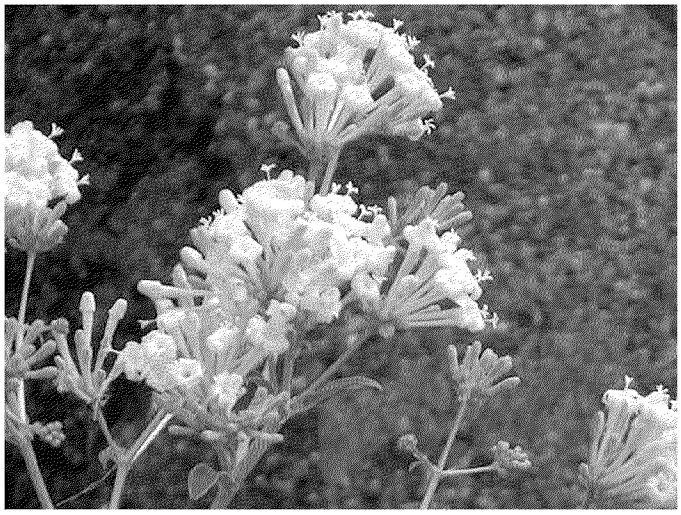
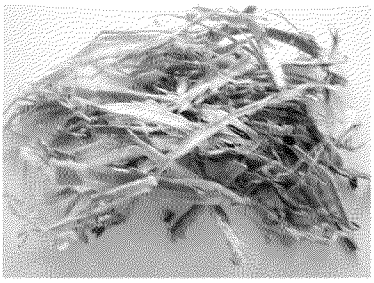
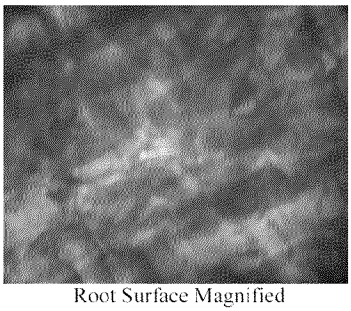
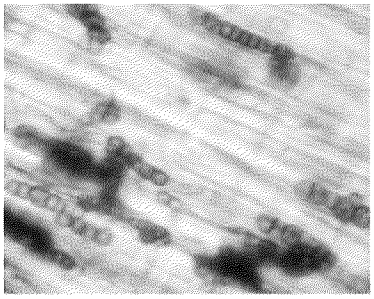


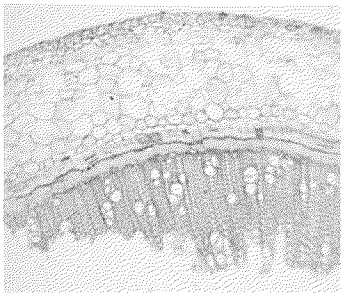
Plate II

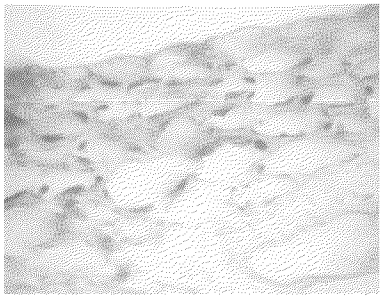
Spermadictyon suaveolens Roxb.

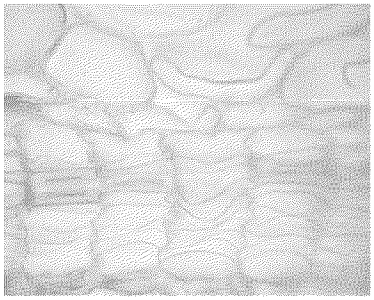

Crude Drug (Outer Layers of Root)

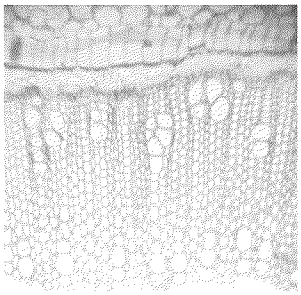

Root Surface Magnified

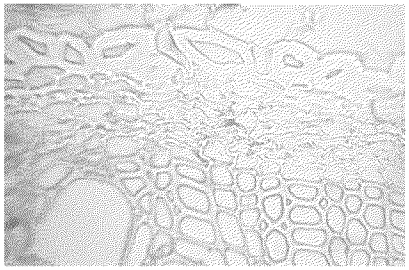

Outermost Layers in Surface View
Showing Brownish Yellow Pigment


T. S. Outer Part of Root


Layers of Outer Cortex


Pericyclic Cambium


Part of Vascular Cylinder


Part of Secondary Phloem

Phytochemistry

Rubiaceae produce wide range of chemical repellants. They contain aluminium, iridoids, anthraquinones, triterpenes, usually indole and other alkaloids, sometimes tannins and proanthocyanins, occasionally saponins. Root tissue was screened for 16 bioactive compounds

and was found to contain 11 compounds viz. alkaloids, acubins, catechol, flavonones, saponins, steroids, triterpenoids, cardiac glycosides, polyoses and polyurenoids. The chemical composition thus makes the drug a strong candidate for further investigations. The tissue is also rich in sodium and phosphorus while small quantity of iron, potassium and calcium were found to be present (Table 2).

Different ash values obtained are shown in Table-1. Qualitative analysis resulted in showing presence of 05 minerals and were quantitatively estimated (Table 2).

Phytochemical Profile

Table 1: Ash values per gm dry tissue.

a.	Ash yield	64 mg/gm
b.	Water soluble ash	64 %
c.	Water insoluble ash	36 %
d.	Acid soluble ash	77 %
e.	Acid insoluble ash	23 %
f.	Sulphated ash	55 %

Table 2: Mineral Profile

Mineral	**Qualitative Estimation**	**Quantitative Estimation**
Sodium	+++	11.5 mg /gm
Potassium	+++	1.75 mg /gm
Calcium	+++	0.67 mg /gm
Phosphorus	+++	14.0 mg /gm
Iron Test a – Test b –	 +++ +++	6.4 mg /gm

Discussion

Spermadictyon suveolens Roxb. is a novel medicine used by Korkus of Melghat. Outer part of root containing part of wood phloem and cortex is used as medicine. The drug material can be identified visually due to the presence of yellowish brown pigment in the cortical cells.

Regulation of fertility through plants or their products is a comparatively new approach in the field of contraceptive development. Because of the side effects of available oral and injectable steroidal contraceptives, subdermal implants and intrauterine devices, efforts have

been made towards the development of new contraceptive agents from plant sources. Vast amount of ethnomedicinal data available includes many drug plants that are used in regulating fertility and in treatment of various reproductive disorders. WHO has computerized information about such 3000 plant species used world over (Kanerkar, 2011).

Saponins with steroidal nucleus are known to act as hormones. In addition to steroidal saponins some other compounds like sesquiterpene lactones act like hormones e.g. vicolide B and D present in *Vicoa indica* (*P. indicum*) exhibit antifertility activity (Rastogi and Mehrotra, 2004).

Conclusion

The species selected here are the ones which are prescribed in traditional medicinal system for fertility regulation. Saponins with steroidal nucleus are known to act as hormones. The plant tissue that tests positive for both is considered to have steroidal saponins. Thus the material can be supposed to be potential abortifacient drug.

Acknowledgements

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6. Primary Characterization and Identification of Bacillus thuringiensis Isolated from the Soil Samples of Nanded District

Kunal P. Deshmukh
Department of Biotechnology,Yeshwant Mahavidyalaya, Nanded.431602, Maharashtra.
Vikram B. Patil
Department of Biotechnology,Yeshwant Mahavidyalaya, Nanded.431602, Maharashtra.

Abstract

Total 78 colonies showing typical characteristics of the *Bacillus* have been isolated from different agricultural and non-agricultural lands from different locations in the district of Nanded. These colonies showed white to creamy white color, slightly raised elevation and regular margins. Because the genus *Bacillus* contains rod-shaped and verified gram-positive bacteria, therefore Gram's staining was performed to eliminate all other bacteria that do not have these two characteristics. Total of 35 colonies were selected from the Gram's staining result and subjected to light microscopy to verify for the presence of endospore and parasporal body in order to distinguish *B. thuringiensis* from other *Bacillus* groups. The presence of endospore and parasporal body was analyzed using the Schaeffer & Fulton spore stain and the Coomassie Briliant blue staining method. In total, 15 colonies were recognized as *B. thuringiensis* by using these methods.

Introduction

Bacillus thuringiensis (Bt) is a ubiquitous Gram positive, aerobic, spore-forming bacterium that forms parasporal crystals during the stationary phase of its growth cycle (Ohba & Aizawa, 1986).

The insecticidal activity of B. thuringiensis *is attributed to the parasporal crystals, also commonly known as delta endotoxins or insecticidal crystal proteins (ICP), which are toxic to the larval forms of the insects belonging to the orders Lepidoptera, Diptera, and Coleoptera (Schneph* et al.*, 1998); but they are harmless to most other organisms, including wildlife and beneficial insects (de Maagd* et al.*, 2001).* The development and application of *Bt* in biocontrol of insect pests and its potential use in medicine have attracted researchers to find novel strains

with different toxic spectra or high activity and new functional genes. (Gao, M., R. *et al.*, 2008). In the present study attempt has been made to study primary characterization and identification of *Bacillus thuringiensis*, isolated from the soil samples of Nanded district.

Materials & Methods

a) Collection of soil sample and isolation of *Bacillus thuringiensis*

Soil samples were collected from Nanded district of Marathwada region of Maharashtra state. It was attempted to collect soil from locations that were as diverse as possible. Soil samples were collected by scraping off surface material with a sterile spatula and then obtained approximately 100-gram samples from 2-5 cm below the surface. All samples were stored in sterile plastic bags at ambient temperature. Isolation of *Bacillus thuringiensis* was performed according to the method of Ohba and Aizawa (1986) and Travers *et al.*, (1987).One gram of each sample was suspended in 10 ml sterile distilled water and pasteurized at 80^0C for 30 min. The isolates were cultured onto T3 sporulating plates (3gm Trypton , 0.05 M Sodium Phosphate pH 6.8 , 0.005 gm $MnCl_2$ per liter) .After 48 hours of incubation at 28^0C colonies with typical *Bacillus thuringiensis* morphology were picked.

b) Microscopic Test

Microscopic test like Gram's staining, endospore staining by Schaeffer & Fulton's sporestain, Coomassie Brilliant Blue staining and motility test were performed for initial screening of *Bacillus thuringiensis* .

Table 1 : Colony characteristics of *Bacillus thuringiensis* isolates on nutrient agar plate:

Isolates	Form	Color	Elevation	Margin
B.thuringiensis mh	Circular	White	Flat	Entire
B.thuringiensis hm	Circular	Creamy white	Elevated	Entire
B.thuringiensis ad	Circular	White	Elevated	Entire
B.thuringiensis bk	Circular	White	Flat	Entire
B.thuringiensis kn	Circular	White	Flat	Entire
B.thuringiensis md	Circular	White	Elevated	Entire
B.thuringiensis um	Circular	White	Flat	Entire
B.thuringiensis kd	Circular	White	Elevated	Entire
B.thuringiensis hd	Circular	Creamy white	Elevated	Entire
B.thuringiensis ng	Circular	White	Elevated	Entire
B.thuringiensis bl	Circular	White	Flat	Entire
B.thuringiensis nd	Circular	White	Elevated	Curled
B.thuringiensis lh	Circular	White	Elevated	Entire
B.thuringiensis dm	Circular	Creamy white	Elevated	Entire
B.thuringiensis dg	Circular	White	Elevated	Entire

Figure 1. Colony characteristics of *Bacillus thuringiensis* isolates on nutrient agar plate:

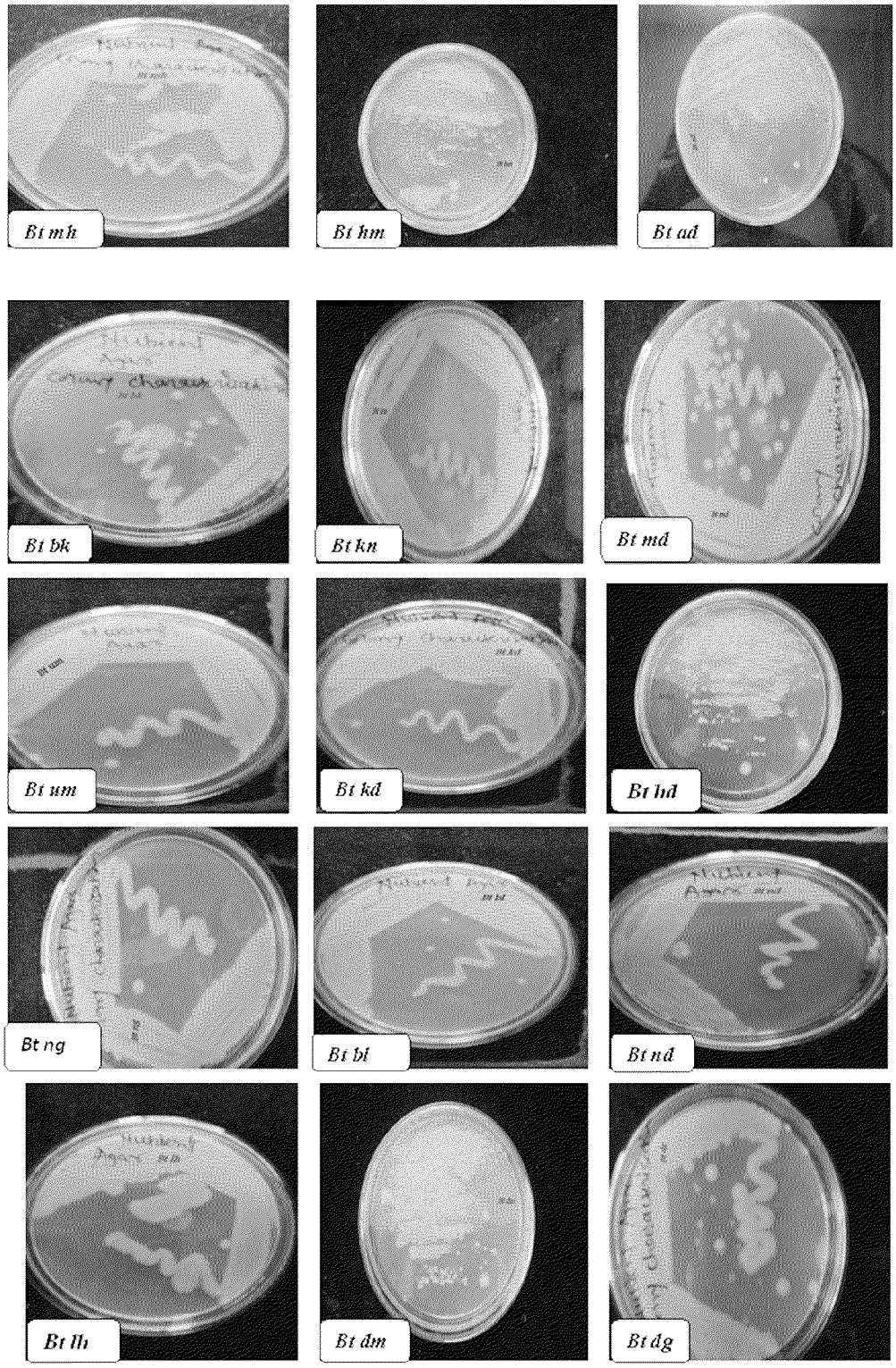


Table 2 : Microscopic Test

Isolates	Gram's staining	Endospore staining	Coomassie Briliant Blue staining	Motility Test
B.thuringiensis mh	G^+	S^+	C^+	+
B.thuringiensis hm	G^+	S^+	C^+	+
B.thuringiensis ad	G^+	S^+	C^+	+
B.thuringiensis bk	G^+	S^+	C^+	+
B.thuringiensis kn	G^+	S^+	C^+	+
B.thuringiensis md	G^+	S^+	C^+	+
B.thuringiensis um	G^+	S^+	C^+	+
B.thuringiensis kd	G^+	S^+	C^+	+
B.thuringiensis hd	G^+	S^+	C^+	+
B.thuringiensis ng	G^+	S^+	C^+	+
B.thuringiensis bl	G^+	S^+	C^+	+
B.thuringiensis nd	G^+	S^+	C^+	+
B.thuringiensis lh	G^+	S^+	C^+	+
B.thuringiensis dm	G^+	S^+	C^+	+
B.thuringiensis dg	G^+	S^+	C^+	+

G^+ = Gram positive , S^+ = Presence of spore , C^+ = Presence of crystal , + = Positive , - = Negative

Figure 2.1 Gram's staining

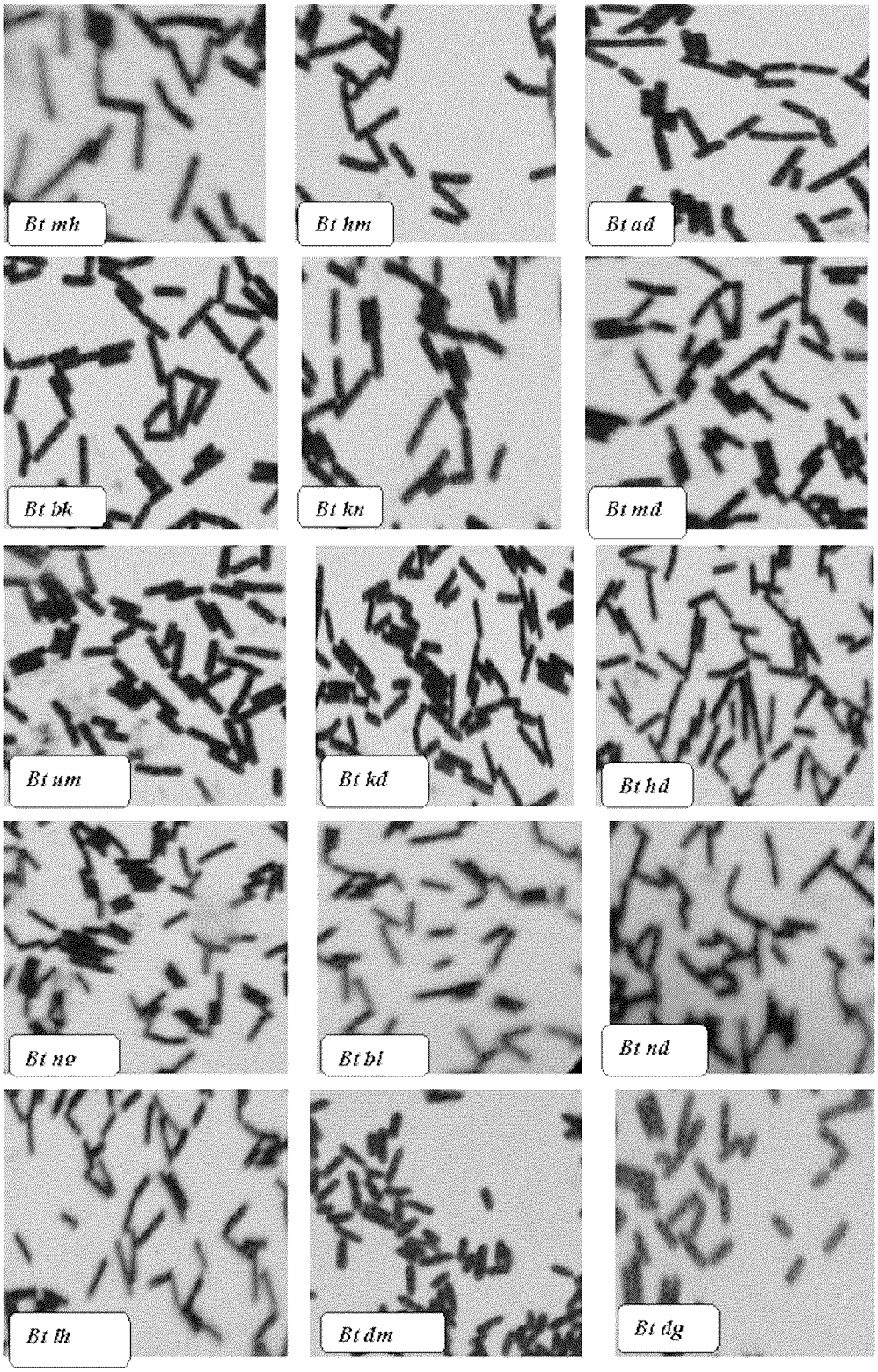


Figure 2.2 Endospore staining

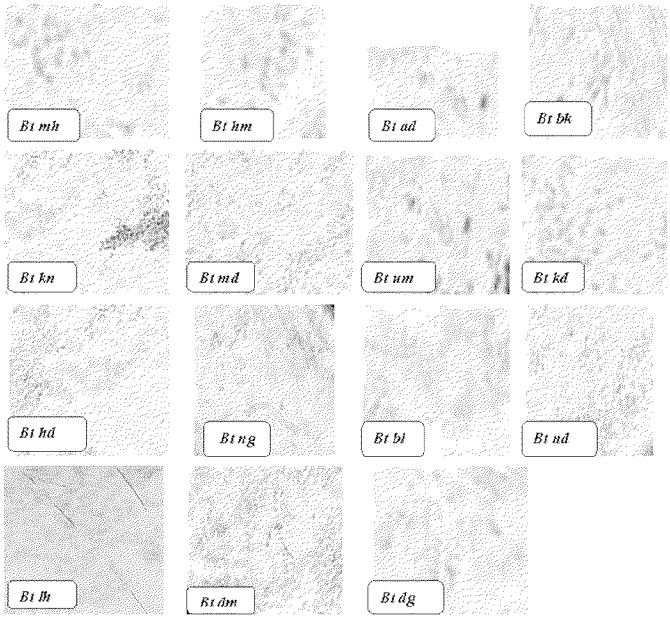
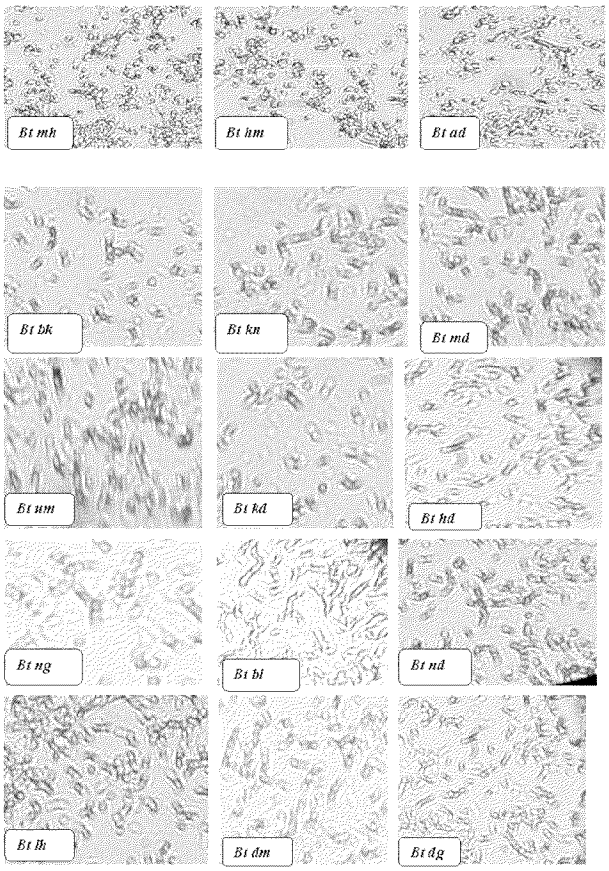


Figure 2.3 Coomassie Briliant Blue staining :



Results & Discussion

The isolates used in this study were obtained from the soil samples from Nanded district. 78 colonies showing the typical *Bacillus* like characteristics were chosen. Colony morphology can help to distinguish *B. thuringiensis* colonies from other *Bacillus* species. The organism forms white, rough colonies , which spread out and can expand over the plate very quickly. These colonies possessed white to off white color, slightly raised elevation and regular margins (Mohammedi *et al*., 2006). Isolates *Bacillus thuringiensis mh*, *Bacillus thuringiensis bk, Bacillus thuringiensis kn , Bacillus thuringiensis um* and *Bacillus thuringiensis bl* showed circular, white , flat colony with entire margin, similar observation was reported by Chatterjee S. N. *et al.,* (2007). Other isolates like *Bacillus thuringiensis ad, Bacillus thuringiensis md, Bacillus thuringiensis kd , Bacillus thuringiensis ng , Bacillus thuringiensis lh* and *Bacillus thuringiensis dg* possessed circular, white but elevated colony with entire margin, Astuti DT *et al*.,2018 mentioned the elevated colony character of *Bacillus thuringiensis* in their study . In addition *Bacillus thuringiensis hm, Bacillus thuringiensis hd* and *Bacillus thuringiensis dm* have circular , creamy white , elevated colony with entire margin, Geeta Goudar *et al*., (2012) also noted the creamy white colony character of *Bacillus thuringiensis* in their study. While *Bacillus thuringiensis nd* showed circular, white, elevated colony with curled margin. The morphological characteristics of *Bacillus* can be seen in figure 1.

These colonies were then isolated and sub cultured into fresh plates. Because the genus *Bacillus* contains rod-shaped and Gram-positive confirmed bacteria, so Gram staining was performed to eliminate all other bacteria that do not have these two characteristics. All rod shaped, Gram positive bacteria, which visualized blue or violet under the light microscope (figure 2.1), were selected, and the remaining isolates that did not acquire such description were discarded. Total of 35 colonies were selected and subjected to light microscopy to screen for the presence of endospore and parasporal body (Figure 2.2 and 2.3) in order to distinguish *B. thuringiensis* from other *Bacillus* groups. Light microscopy was performed after 90 hour to ensure the presence of parasporal bodies. The colonies were microscopically observed and those having visible parasporal inclusions were classified as *B. thuringiensis* (Bernhard *et al*., 1997), and selected for further characterization. In total 15 colonies were recognized as *B. thuringiensis* by using this method. All the 35 isolates were further stained with Coomassie Brilliant Blue and viewed under Light microscope. About 15 samples were selected and these isolates were

confirmed as *Bt* as the presence of parasporal bodies was instant and noticeable evident by the presence of numerous dark-blue staining objects (Figures 2.3). The use of Coomassie Brilliant Blue stain relatively allowed a swift and efficient assessment of the 15 isolates.

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7. Study of Toxicity Effect of Zinc Sulphate in the Fresh Water Crab, Paratelphusa Jacuemontii (Rathbun)

Nita S. Labhsetwar
Department of Zoology, B. B. Arts, N. B. Commerce and B. P. Science College, Digras, Dist-Yavatmal, Maharashtra, India.

Abstract

Pollution of heavy metals in ecosystems is a serious and long lasting effect. The aim of this research work was to assess the effects of zinc sulphate on the organism Paratelphusa jacquemontii (Rathbun) with environmental parameters interaction. This research work is to investigate the interaction effects of environmental factor stress along the heavy metallic pollutants.

Keywords: *Zinc Sulphate, crab, metal, pollutant*

Introduction

Pollution of water resources is a common problem being faced today. Pollutants enter the aquatic environment in various ways. Risk assessment procedures for substances have been developed to minimize risks for aquatic ecosystem (EPA, 1984). In these procedures, a major role is assigned to standard toxicity tests in the laboratory in which sensitivity of organisms to individual substances or field samples in determined.

Toxicants and environmental factors can interact in a variety of ways. Changing environmental conditions may influence the bioavailability of chemicals.

Trace metals are important persistent pollutants in aquatic ecosystems worldwide and are especially prevalent in freshwater, estuarine and coastal marine ecosystems exposed to high degrees of urban pressure (Lau et al., 1998; de Mora et al., 2004; Hyun et al., 2006) Moreover, recent studies indicate that human activities significantly affect trace metal levels even in remote parts of the globe.

Metals can accumulate in aquatic organisms and are easily transferred through the food chain to the top consumers, including humans (Wallace and Lopez, 1996; 1997; Wallace and Luoma, 2003; Wallace et al., 2003; Fisk et al., 2005).

Materials and Methods

Character of the freshwater crab, Paratelphusa jacquemontii:

The crabs, *P. jaquemontii* were collected from around Amravati (Vidarbha, Maharashtra) brought to the laboratory and maintained in plastic containers having sufficient amount of freshwater.

Medium Sized male and female crabs, *P. Jacquemontii* of intermoult stage and more or less of same size and weight, 55-65 gms with carapace width 6.5 x 5.3 cms were selected for experiments. Crabs were not fed during the experimental periods. The test medium was changed every 24 hrs to maintain the concentration.

The experimental crabs were nearly uniform in size, having the same weight, age male and female with intermoult stage and reared under the same conditions in order to reduce any bias in the experiment (Tankar, 1985; Nimgare, 1992). The crabs were chosen as test animals because of their availability throughout the year,easy to rear and their wide distribution in natural water particularly in Amravati.

Results and Discussion

3.1.3. Toxicity of zinc sulphate and interaction of ecological parameters:

3.1.3.1. Zinc sulphate toxicity

After 24 hours exposure, the percentage mortality of the freshwater crab was 6.6, 10.0, 23.3, 43.3, 53.3, 63.3, 80 and 90 respectively in corresponds to the concentrations of zinc sulphate used 40, 60, 80, 100, 120, 140, 160, 180 mg/1 (Table 1). Crabs in the highest concentration of zinc had the greatest mortality. The 24-hour LC50 value for the crab was 56.57 mg/1).

Table 1 The 24- hour acute toxicity of zinc sulphate bioassay on freshwater crab patatelphusa jacquemontii (5.657)

Conc. (mg/1)	Log Conc.	Mean no Crabs Exposed	Mean no Crabs Dead	Expected Mortality	Mortality Rate %	Graphical Interpolation	Probit Analysis
40	1.6020	10	1	00	00	00	0.0000
60	1.7781	10	2	10	10	10	3.7184
80	1.9030	10	2	22	20	18	4.1584
100	2.0000	10	3	32	30	30	4.7467
120	2.0791	10	4	44	40	50	5.0000
140	2.1461	10	6	60	60	64	5.2533

160	2.2041	10	7	70	70	70	5.5244
180	2.2552	10	8	76	80	72	5.8416

When the crabs were exposed to zinc sulphate at 10, 20, 30, 40, 50,60, 70, and 80 mg/l for 48-hour, their percentage mortality was 23.3, 26.7, 33.3, 46.6, 50.0, 63.3 and 86.7 respectively (Table 2). Crabs in the highest concentration of zinc had the greatest mortality. The 48-hour LC50 value for the crab was 41.53 mg/l

Table 2 The 48- hour acute toxicity of zinc sulphate bioassay on freshwater crab patatelphusa jacquemontii (4.153)

Conc. (mg/1)	**Log Conc.**	**Mean no Crabs Exposed**	**Mean no Crabs Dead**	**Expected Mortality**	**Mortality Rate %**	**Graphical Interpolation**	**Probit Analysis**
10	1.0000	10	1	10	10	10	3.7184
20	1.3010	10	2	22	20	28	4.1584
30	1.4771	10	3	36	30	36	4.7467
40	1.6020	10	4	44	40	38	5.0000
50	1.6989	10	6	58	60	66	5.2533
60	1.7781	10	7	74	70	80	5.5244
70	1.8450	10	7	86	70	90	5.8416
80	1.9030	10	8	80	80	80	5.8416

When the freshwater crabs were exposed to zinc sulphate at 10, 20, 30, 40, 50, 60, 70 and 80 mg/l for 72-hour, their percentage mortality was 13.3, 20.0, 33.3 36.7, 46.7, 66.7 and 70 respectively (Table 3). Crab in the highest concentration of zinc had the greatest mortality. The 72-hour LC_{50} value for the crab was 34.89 mg/l.

Table 3 The 72- hour acute toxicity of zinc sulphate bioassay on freshwater crab patatelphusa jacquemontii (2.937)

Conc. (mg/1)	**Log Conc.**	**Mean no Crabs Exposed**	**Mean no Crabs Dead**	**Expected Mortality**	**Mortality Rate %**	**Graphical Interpolation**	**Probit Analysis**
10	1.0000	10	0	00	00	00	0.0000
20	1.3010	10	1	12	10	10	3.7184
30	1.4771	10	2	22	20	18	4.1584
40	1.6020	10	3	32	30	28	4.7467
50	1.6989	10	4	42	50	40	5.0000

60	1.7781	10	5	50	60	50	5.2533

Table 4 The 96- hour acute toxicity of zinc sulphate bioassay on freshwater crab patatelphusa jacquemontii (2.937)

Conc. (mg/1)	**Log Conc.**	**Mean no Crabs Exposed**	**Mean no Crabs Dead**	**Expected Mortality**	**Mortality Rate %**	**Graphical Interpolation**	**Probit Analysis**
10	1.0000	10	0	00	00	00	0.0000
20	1.3010	10	1	12	10	10	3.7184
30	1.4771	10	2	22	20	18	4.1584
40	1.6020	10	3	32	30	28	4.7467
50	1.6989	10	4	42	40	40	5.0000
60	1.7781	10	5	50	50	50	5.2533
70	1.8450	10	6	60	60	66	5.5244
80	1.9030	10	7	70	80	70	5.8416
70	1.8450	10	6	60	70	66	5.5244
80	1.9030	10	7	70	80	70	5.8416

When the crabs were exposed to zinc sulphate at 10, 20, 30, 40, 50, 60, 70 and 80 mg/l for 96-hour, their percentage mortality was 0, 6.7, 20.0, 50.0, 66.7 76.7 and 93.3, respectively (Table 4). Crabs in the highest concentration of zinc had the greatest mortality. The 96-hour LC50 value for the crab was 26.37 mg/l.

Similar results were also recorded by Abdullah AM and MP Ireland(1986) Acute toxicity of Zinc had been reported on many species of invertebrates by various authors.Eisler (1971) also carried out acute toxicity bioassays on various marine invertebrates.He found that the animals tested,Crustaceans,were the most sensitive to cadmium and zinc.The percentage mortality of Paratelphusa jacquemontii caused by zinc increased with increasing concentration and exposure times.Similar trend was observed in case of temperature and pH.Higher mortality was observed in higher temperature and acidic medium with higher exposure period as compared to low temperature and alkaline conditions.Low temperature and alkaline medium had reduced toxic impact.Changed pH of medium also has effect on toxicity

i.e.acidic medium was more toxic than alkaline medium.

Table : 5 Series of concentrations used for determining the median lethal concentrations of metal compounds on the freshwater crab, *Paratelphusa jacquemontii* (Rathbun) at different experimental exposure hours

Metals	Exposure period (h)	Serial dilutions (ppm)
Zinc sulphate	24	20,40,60,80,100,120,140,160,180
	48	10 20,30,40,50,60,70,80,90
	72	10 20,30,40,50,60,70,80
	96	05,10,20,30,40,50,60,70,80

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8. Length-Weight, Length- Height, Height-Weight Relationship of Fresh Water Bivalves, Lamellidens Marginalis and Lamellidens Corrianus from Nanded Region Maharashtra

A. V. Suryawanshi
Research Scholar Dept. of Fishery Science N.E.S .Science College Nanded. (M.S.)
A. N. Kulkarni
Head, Dept. of Fishery Science, N. E. S. Science College Nanded. (M.S.)

Abstarct

Lamellidens marginalis showed relationship between length-weight was $W = 1.3899L^{0.1644}$ and length-height was $H = 0.7670L^{0.2222}$ and weight-height was $W = 1.6027L^{0.0011}$. *Lamellidens corrianus* showed relationship between length-weight is $W = 1.2564L^{0.3103}$ and length-height is $H = 0.0978L^{0.7333}$ and weight-height is $W = 1.4442L^{0.2827}$. obtained result indicated that their exist a relationship between Length-weight, Length- height, height-weight of mussels. Their relationship follows cub law.

Key words- *Lamellidens marginalis, Lamellidens corrianus,* Length, Weight, Height.

Introduction

Lamellidens marginalis and Lamellidens corrianus commonly found in fresh water resources including rivers, dam and reservoir; in the Nanded region of Maharashtra. changes in the length and weight are according to their habitat and life cycle, (La-Cren, 1951); Size of shell is more affected than their shape by fluctuation of ambient environment (Seed, 1968); Wilbur and Owen, 1964); Nagbhushanam and Lomte,1971); Narian, 1972 Nagbhushanam and Lohgaonkar, 1978: Lomte and Jadhav, 1980 and Moorthy *et al* ., 1983, have studied the length weight relationship in fresh water mussels. Similar observations are also made by Desai and Borker, 1989. Reported a non linear relationship in inhibiting Khandepar river, Goa.

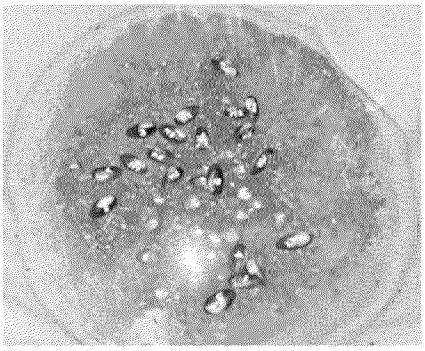
Material and Methods

Lamellidens corrianus and *Lamellidens marginalis* were collected from Naigoan dam, district Nanded, Maharashtra in Jan 2013 from Nanded district and kept in laboratory for acclimatization, for eight days in plastic pools with sand at the bottom. After acclimatization 20

specimen of each species were selected and they were marked with oil paint marker pen. Before experiment their weight in gm was taken by using monopan electric balance and height and length was measured in cm by meter scale. Length was measured from maximum antero-posterior distance and height was from maximum distance from hinge to ventral margin. after measuring the Length-weight, Length- height, height-weight relationship was determine. For growth study after every month length, height and weight was measured and recorded for a complete one year, from Jan 2013 to Jan 2014. During this period they were fed with plankton. Water was changed every day by using fresh water, and dead animals were removed. Dissolve oxygen content maintained by aerating the water. Length weight relationship was calculated by using Cube-Law described by **(Le-Cren, 1951).**

$$W = a\ L^b$$

Where as a and b is constant.



Plastic pool with tagged Mussels

Length and Height measurement

Result and Discussion

Lamellidens marginalis showed relationship between length-weight was $W = 1.3899L^{0.1644}$ and length-height was $H = 0.7670L^{0.2222}$ and weight-height was $W = 1.6027L^{0.0011}$. Relationship of *Lamellidens corrianus* between length-weight is $W = 1.2564L^{0.3103}$ and length-height is $H = 0.0978L^{0.7333}$ and weight-height is $W = 1.4442L^{0.2827}$. obtained result indicated that their exist a relationship between Length-weight, Length-height, height-weight of mussels. Their relationship follows cub law.

Table No 1.34 shows length-weight, length-height, and height-weight relationship of *Lamellidens marginalis* from Nanded, Maharashtra.

Tag no.	Av weight	Av length	Av height	Log of (Y) (X)	Y^2 X^2	YX XZ	Calculated Y

	(Y) gm	**(X) cm**	**(H) cm**	**(Z)**	**Z^2**	**YZ**	**X Z**
1 - 5	30.145	19.149	12.649	1.4792 1.2821 1.1021	2.1880 1.6437 1.2146	1.8964 1.4130 1.6302	1.6351 1.0518 1.6039
6 – 10	45.892	21.031	11.565	1.6617 1.3229 1.0631	2.7612 1.7500 1.1301	2.1982 1.4063 1.7665	1.663 1.0609 1.6038
11 - 15	41.361	19.831	10.699	1.6166 1.2973 1.0293	2.6133 1.6829 1.0594	2.0972 1.3353 1.6639	1.6556 1.0552 1.6038
16 - 20	45.518	20.181	10.732	1.6582 1.3049 1.0307	2.7496 1.7027 1.0623	2.1637 1.3449 1.7091	1.6625 1.0569 1.6038
Total	**162.916**	**80.192**	**45.645**	**$\sum Y$= 6.4157 $\sum X$= 5.2072 $\sum Z$= 4.2252**	**$\sum Y^2$= 10.3121 $\sum X^2$= 6.7793 $\sum Z^2$= 4.4664**	**$\sum YX$= 8.3555 $\sum XZ$= 5.4995 $\sum YZ$= 6.7697**	

Table No. 1.35 shows length-weight, length-height, and height-weight relationship of *Lamellidens corrianus* from Nanded, Maharashtra.

Tag no.	**Av weight (Y) gm**	**Av length (X) cm**	**Av height (H) cm**	**Log of (Y) (X) (Z)**	**Y^2 X^2 Z^2**	**YX XZ YZ**	**Calculated Y X Z**
1 – 5	50.15	21.013	11.632	1.7003 1.3225 1.0657	2.8910 1.7490 1.1357	2.2486 1.4093 1.8120	1.784 1.0675 1.6652
6 – 10	43.298	20.399	11.516	1.6365 1.3096 1.0613	2.6781 1.7150 1.1263	2.1431 1.3898 1.7368	1.7642 1.0581 1.664
11 - 15	38.443	19.333	10.832	1.5848 1.2863 1.0347	2.5115 1.6545 1.0706	2.0385 1.3309 1.6397	1.7481 1.041 1.6565
16 - 20	54.291	21.716	12.132	1.7347 1.3368 1.0839	3.0091 1.7870 1.1748	2.3189 1.4489 1.8802	1.7946 1.078 1.6704
Total	**186.182**	**82.461**	**46.112**	**∑Y= 6.6563 ∑X= 5.2552 ∑Z= 4.2456**	**$\sum Y^2$ = 11.0897 $\sum X^2$= 6.9055 $\sum Z^2$= 4.5074**	**∑YX= 8.7491 ∑XZ= 5.5789 ∑YZ= 7.0687**	

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9. Limnology of Lasanapur Nala Sewage Water, Dist. Amravati

R. G. Jadhao
Associate Professor and Head, Department of Zoology, Shri Shivaji Arts, Commerce and Science College, Akot (M.S.)

Abstract

The sewage water quality of Lasanapur Nullah and its physico chemical Pararmeter were studied. The water quality analysis includes pH. DO, Conductivity, TDS, Salinity, T.S.S.,Total hardness andCl. The Water Sample were collected from five station of Lalkhadi Nullah (Station I to V) from The month Nov. 2017 to Jan. 2018 and analyzed for suitaibility of cultivation of vegetables. It was found that the sewage water was good for cultivation of vegetables because vegetales were cultivatied in the fields of Lalkhadi village shown the accumntation of Chloride, Magnesium in traces which will gets accumulated in the body of peoples who ate vegetables purchased from Cotton market vegetable sellers, Amravati.

KeyWords: Lasanapur Nala sewage water, physicochemical parameters.

Introduction

Healthful environment is fandamental right of every person. Health aware people are always intersted about the impact of environment on them. But recently it was observed that human action affect the natural condition of environment. Due the heman action, the environment is greatly gets disturbed in the form of water pollution. Also, various parts of our Nation, on contrary are experiencing drought clamatic changers. Water plays a vital role in human life and it forms a major source of irrigation in urban and rural areas. As water is an universal solvent & it's an "Elixier of life". The sewage water contains substance like Chloride,Magnesium etc. Some harmful substances like Arsenic, calcium, & magnessium salts are found present more than the permissible limits leads to pollute water bodies .

Therefore in view of above, it has great importance and its parameters were studied. The sewage water analysis of Telkhadi nullah involved pH, conductvity, Chloride, TSS, TDS, total hardness, DO,salinity etc. The disposal of sewage sludges of soil acts as a fertilizar for agriculture is the most attractive application. Because shudge acts as a source of nutrients for

vegetables crop production owing of their high content of organic matters (Walter et al, 1994). Sewage water contains excreta, waste waters from cloth washiing, kitchen waste, bathing water, food particals and garbage etc. Domestic pollutants in association with organic, inorganic matter alongwith dissolved solids and other unwanted chemicals causes serious ground water problems (Tyagi 2000). The sewage water gets accumunlated in the form of stagnant water and if accidently there happens occurrence of pipeline of drinking water, there is a probability mixing of sewage water into drinking water, Heavy metal accumulates in the environment through various geochemical form i.e. water soluble exchangeble, carbonate associated,Fe-Mn oxide associated, organic associated and residual form (He et al, 2005, Cuong and Obbard, 2006). Heavy metals can gets activey bound by living microorganism by the (1) intracellular accumulation, (2)extra cellular precipitation and (3) chemical transformation which were catalysed by microorganisms mechanism, such as oxidation reduction, methylation, dimethylation etc. The Heavy metals mobility and Toxicity in soils depends on their total concerntation and specific chemical form binding state, metal properties including environmental factors and soil properties like pH, Organic matter content (Nyamangara,1998, Luetal, 2003). Extra hevey metal accumtaion in environment is toxic to all living organism including man. Exposure to hevey metals is normally chronic, due to food chain transfer. Acute toxicity of heavy metal is rare through an oral intake or dermal contact.

The present paper deals with the physicochemical parameters of sewage water of Lasanapur nullah, District Amravati (M.S.).

Material and Method :

The sewage water samples from five station (Station I to V) of Lalkhadi nullah, was collected monthly from Nov. 2017 to Jan 2018 in plastic bottels and brought to the laboratory and analysed within 24 hours. The sewage water pH and condutivity were recorded by the water analysis kit (Century C.K. 711). Physico-chemical properties of sewage water of Lalkhadi nullah was analysed by standard methods of APHA, 2000; Trivedi and Goel, 1984).

Result and Discussion :

1) Conductiviy : The Conductiviy of sewage water sample of Lasanapur reported from 790.36± 0.470 to 1350.00 ± 0.445 us/cm. Station III has highest Conductivity (1350.00 ± 0.445 us /cm) while station IV has lowest conductivity 790.36 ± 0.470 us/cm). Electric concuctivity of sewage water directly related to the concentration of

dissotved ionized solids in sewage. Ions from dissolved solids in sewage water create the ability of the sewage to conduct an electrical current.

2) DO: The dissolved oxygen recorded from station I to V is very low i.e. 1.10 ± 0.20 to 1.60 ± 0.10 mg/L. Due high decomposition of organics substances in sewage.

3) pH.: The pH of sewage water sample was recoded from highest range 9.09± 0.005 to lowest range 7.05 ± 0.003. The increase in pH due to organic pollution, alkaline chemicals, soap and detergents due the addition of domestice sewage into the water of Lasanapur nullah.

4) Total Hardness: Total hardness was reported from sewage water, highest was 2130.070 ± 0.330 mg/L and lowest wsa 1957.175± 0.043. It represents the concerntation of magnesium and chloride. The permissible limit is 200 mg/l in water as per ISI, our finding was higher than result obtained by Krishnanet al., (2007), Roy and Kumar (2002). Permanent hardness is mainly caused by chlorides and sulphates (Roy and Kumanr, 2002).

5) Chloride :

The chloride was recorded from 460.290 ± 0.035 mg/L to 280.290± 0.110 mg/l. The high percentage of chloride was due to dissociation of salts from domestic activities.

6) Salinity : The salinity was reported from 510.201± 0.229 mg/l to 470.010 ± 0.380mg/l. High salinity of sewage water might be due to maximum discharge of domestic water containing high percentage of chlorides. The salinity of sewage recorded in this paper shown lower than the results recorded by Krishnan et al. (2007).

7) TDS: (Total dissolved solids).: The total disolved solids were recorded i.e. highest 850.20 ± 0.010 mg/l to Lowest 870.300 ± 0.280 mg/l. It happens due to the mixing molecular, ionized or micro granular suspended forms. Increased level of TDS indicants hard water, which can cause scale built up in pipes, valves and filters. High TDS sewage water can produce laxative effect, gives an unpleasant mineral taste to water, unsuitable for different industrial application, reduces water clarity, declined Photosynthesis rate , combines with toxic substances and heavy metals could lead into an increase in sewage water temperature.

8) TSS: (Total suspended solids): - TSS were recorded highest value 19970 ± 0.248mg/l to lowest 17760 ± 0.220 mg/l. The high quantity of TSS is due to the discharge of domestic waste Palanivel, M and P, Rajgure (1999). The high TSS sewage water can causes problems of stream water and aquatic life by blocking sunlight, do not permit to pass across water due to thick submerged vegetation also reduces photosynthesis rate there by gross deplete of DO.

Table 1.Physico chemical parameter of sewage water of Lasanapur nullah from station I to V.

Sewage water sample and station	Physico chemical parameters of Lasanapur Nala Sewage water							
	conductivity us/cm	DO mg/L	pH	Total hardness mg/L	Cl mg/L	Salinity mg	TDS mg/L	TSS mg/L
Station-I	1202.45± 0.280	1.8±0.10	7.05± 0.003	1957.175±0.043	340.400 ±0.006	470.010±0.380	850.20 ±0.010	17760 ±0.220
Station-II	115o.35± 0.585	1.10 ±0.20	8.08 ± 0.045	2010.215 ± 0.235	280.290 ±0.110	480.700 ±0.200	790.10 ±0.295	18880 ± 0.145
Station-III	1345.00 ± 0.445	120 ± 0.10	9.09± 0.005	2101.050 ± 0.250	370.340 ± 0.320	510.201± 0.229	870.030 ± 0.280	19970 ± 0.248
Station-IV	79o.36 ± 0.470	1.50 ± 0.30	8.40 ± 0.005	2201.060 ± 0.310	430.300 ± 0.050	498.105± 0.160	820.15± 0.295	19680 ± 0.235
Station-V	1170.20 ± 0.380	1.60 ± 0.20	7.540 ± 0.010	2130.070 ± 0.330	460.290 ± 0.035	501.254± 0.253	876.18± 0.037	18830 ± 0.295

Conclusion

The sewage water parameter levels recorded are highest than that of permissible limit of domestic water used for agriculture and fish culture.

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10. Lipid Contents in Polyoncobothrium and its Host Mastacembelus Armatus

D. B. Bhure
S. S. Nanware
M. U. Barshe
A. A. Page
M. M. Kalyankar

Abstract

The present study is undertaken to determine the lipids content in Cestodes *Polyoncobothrium* Sp. and its host tissue i.e. infected and normal intestinal tissue. The present study indicates that the amount of lipid in *Polyoncobothrium sp.* is lower (10.42 mg/gm) as compared to protein present in infected intestinal tissue of *Mastacembelus armatus* (12.48 mg/gm) as well as in normal host intestinal tissue of *Mastacembelus armatus* (13.46 mg/gm). The content of lipid in parasite body is variable due to the difference in its diet. The lipid content may vary considerably even in the same species, parasitic in the same host species but fed on different diets

Key words- Cestode, Lipid Content, *Mastacembelus armatus , Ptychobothrium sp.*

Introduction

Lipids are naturally occurring molecules that include fat, waxes, sterols, fat-soluble and vitamins (such vitamin A,D, E and K), monoglycerides, diglycerides, phospholipid and other. Lipids are of great importance to the body of cestodes as the chief concentrated storage form of energy, besides their role in cellular structure and various other biochemical functions. Lipids metabolism in cestodes has been worked out to only a limited extent. But gas chromatography and column chromatography has revolution lipid analysis.

Materials and Methods

For the collection of Cestode parasites, the intestine of *Mastacembelus armatus* were collected from different localities of Nanded. Collected worms were washed; preserved in hot 4 % formalin; stained in Borax carmine; Stained specimens were dehydrated through ascending alcoholic grades i.e. 30%, 50%, 70%, 90% and 100%, cleared in xylene and mounted in DPX. Drawings are made with the aid of camera lucida for taxonomic identification. The Cestode

parasites collected from intestine of fish host *Mastacembelus armatus* was identified as *Polyoncobothrium* Sp.

The lipid content in cestode parasites and host intestines was estimated by Folch et..al. 1957 method. The lipid concentration was expressed as mg/gm wet weight of the tissue.

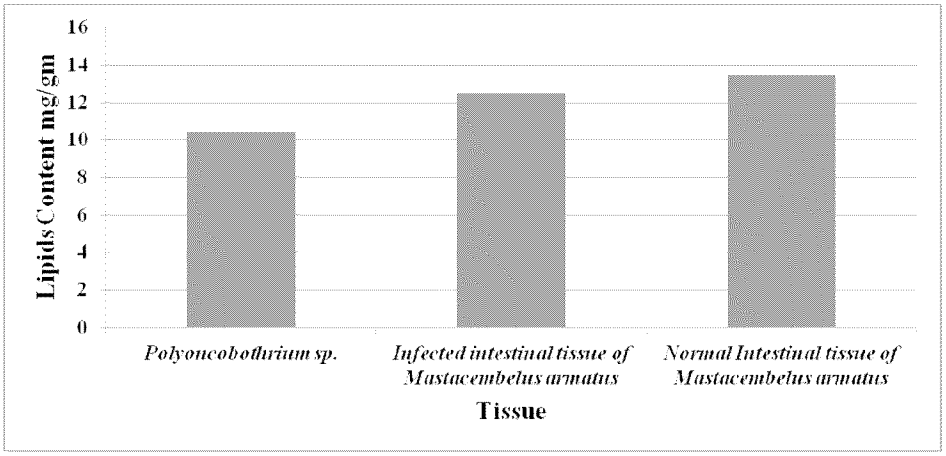
Results

Result obtained in present study indicates that amount of Lipids present in *Polyoncobothrium sp.* is lower (10.42 mg/gm) as compared to protein present in infected intestinal tissue of *Mastacembelus armatus* (12.48 mg/gm) as well as in normal host intestinal tissue of *Mastacembelus armatus* (13.46 mg/gm).This is summarized in table and graph.

Table 1:- Comparative chart of Lipids contents in *Polyoncobothrium sp.*, infected intestinal tissue and Normal intestinal tissue of *Mastacembelus armatus*.

Lipid contents (mg/gm wet weight of Tissue)		
Polyoncobothrium sp.	**Infected intestinal tissue of *Mastacembelus armatus***	**Normal Intestinal tissue of *Mastacembelus armatus***
10.42	12.48	13.46

Graph 1:- Graph showing Lipids contents in *Polyoncobothrium sp.*, infected intestinal tissue and Normal intestinal tissue of *Mastacembelus armatus*.



Discussion

Similar finding were recorded by Dhondge et.al., 2011studied lipids content in avian Cestodes viz. *Cotugnia orientalis* Sp., *Railleitina microscolenia* Sp., *Davenia yamaguti* Sp., *Vampirolepis indica* Sp. are lower than its host tissue i.e. infected and normal intestinal tissue. Pathan and Bhure,2017 reported content of lipid in cestode parasites were lower than host tissue. Jadhav et.al 2008 from *D.shindei* is 17.85 mg/gm and its host intestine is 19.85 mg/gm.

According to Botero and Ried (1969) worm from low fat diet content 10.1% lipid and worms from birds on a high fat diet contained 29.6% lipid. Hence there is a relationship between the lipid content of the parasite and nutrient content in environment. There is considerable variation in lipids from species to species and the degree of lipid content. Variation is also seen in the segments and regions of the worms being experimented thus total lipid to be somewhat meaningless, unless the degree of maturity is known. M.R. Siva Sai Kumari (1994) reported the total lipids content of cestode *Ncokrimia singhia* in immature matur and gravid region was 4.675 + 1.215, 29.200 + 0.608 and 31.902 + 2.804 mg/gm fresh weight.

Conclusion

The lipid content may vary considerably even in the same species, parasitic in the same host species but fed on different diets. Present study indicates amount of lipid is lower in parasite than infected and normal intestinal tissue of host.

Acknowledgements

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11. Documentation on Some Traditional Uses of Ethnic Plant Species

Chavhan V. N.
Department of Botany, Arts, Commerce and Science College, Maregaon (Road) Dist. Yavatmal, (M.S.) India.
M. J. Dagawal
Department of Botany, Smt Radhabai Sarda Arts, Commerce & Science College, Anjangaon Surji, Dist. Amravati (M.S.) India.

Abstract

Present paper deals with some ethno medicinal uses of 21 plant species, by the tribal of Arni tehasil, in Yavatmal district of Maharashtra. This region is inhibited by tribal communities like Banjara, Gond, Mang, Paradhi etc. The ethno botanical information on plants viz., botanical name, family, local name, plant part used and mode of administration is enumerated.

Keywords: Traditional Uses, Tribal, Medicinal Plant, Arni tehasil, Yavatmal district.

Introduction

The medicinal plants have been in the focus as life saving drugs right from the beginning of the human civilization. The medicinal plants have been the object of research in both systematic and advanced areas of plant sciences. The tribal's have the knowledge of medicinal and another uses of plants growing in the forests. Tribal medicine men know the exact preparation of the medicine and diagnosis of the diseases (Harshberger, 1896).

Some tribes are adhering to traditional way of life, native culture and customs, the tribal have vast store of information and knowledge on potentially useful medicinal plants. The traditional knowledge system in India is fast eroding due to steady decline in human expertise capable of recognizing various medicinal plants. Much of this wealth of knowledge is totally becoming lost as traditional culture is gradually disappearing because it is mostly oral (Hamilton, 1995). Therefore, effort should be initiated for the documentation and computerization of useful medicinal plants and their traditional knowledge (Mehrotra & Mehrotra, 2005).

The value of medicinal plants to the mankind is very well proven. It is estimated that 70 to 80% of the world population rely chiefly on traditional health care system and largely on herbal medicines (Shanley and Luz, 2003). Only 15% of pharmaceutical drugs are consumed in

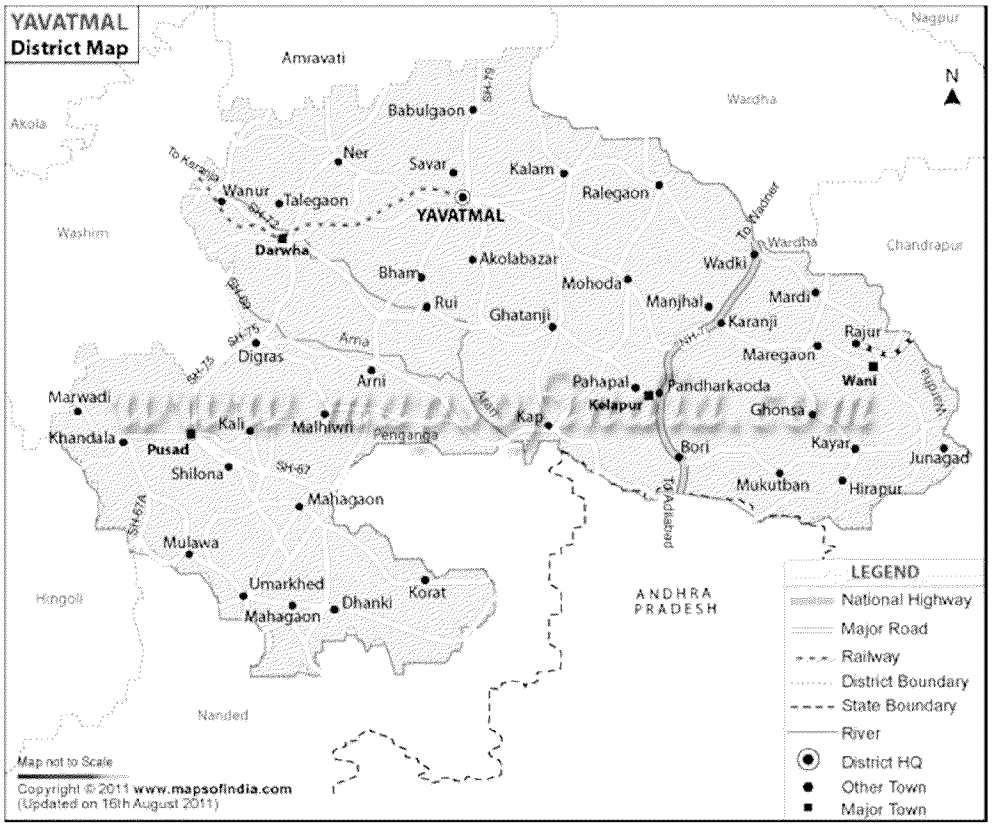
developing countries (Toledo, 1995). The affluent people have little alternative to herbal medicine, and they depend on traditional health care system (Marshall, 1998).

The 177 medicinal plants are used by Banjaras of Vidarbha on various ailments (Bhogaonkar and Chavhan, 2013). Bhogaonkar and Kadam, 2006 and 2005, documented 39 plant species used in treatment of reproductive disorders while 20 monocotyledonous plant species are used in various diseases by the tribal of Umarkhed tehasil in Yavatmal district. They have further documented 36 ethnic formulations that are prepared using 50 plant species by locals of Umarkhed tehasil (2006).

In the present paper, folk medicinal preparations of 21 plant species used for different ailments has been enumerated.

Study Area

The district Yavatmal is situated in the eastern part of the Maharashtra between north latitudes 19^0 23` and $20^0$ 48` and longitudes 77^0 19` and $79^0$ 07. `It occupies an area of 13,582 Sq. Km.



Material and Methods

Tribal medicine men, village heads and local people were interviewed to record different plant part used for folk remedies. Plants were collected, documented and identified with the help of standard floras (Hooker 1997, Cooke 1967, Naik 1998, Yadav and Sardesai, 2002) and herbarium specimens were prepared.

Enumeration

The interviewed of local people and tribal medicine mans information are recorded, is as follows-

Plant Name	Family	Local Name	Habit	Mode of Uses
Abrus precatorious L.	Fabaceae	Gunj	Climber	Root powder is used in mouth problem.
Acacia leucophloea (L.) Willd.	Mimosaceae	Hiwar	Tree	Inner bark is given in lever problem
Annona Squamosa L.	Annonaceae	Seetaphal	Tree	Seed powder is applied to scalp and hair to remove dandruff and lice.
Anogeissus latifolia (Roxb. ex DC.) Wall. ex Bedd.	Combretaceae	Dhawada	Tree	Bark gum is used as a tonic.
Biophytum sensitivum (L.) DC.	Oxalidaceae	Lajalu	Herb	Whole Plant is given for increasing the milk secretion
Coccinia grandis (L.) Voigt.	Cucurbitaceae	Tondali	Climber	Fruit is used in mouth ulcers.
Cocculus hirsutus (L.) Diels	Menispermaceae	Vasanvel	Climber	Leaf Paste is applied on the eczema
Dichrostachys cinerea (L.) Wight & Arn.	Mimosaceae	Murmuthi	Small Tree	Root paste is applied in bone fracture.
Flacourtia indica (Burm. f.) Merr	Flacourtiaceae	Kakai	Shrub	Leaf Juice is given in Jaundice
Grewia tiliaefolia Vahl	Tiliaceae	Dhaman	Tree	Stem bark juice is given in diarrhoea and dysentery.
Hyptis suaveolens (L.) Poit.	Lamiaceae	Rantulas	Under Shrub	Leaves are used in healing wounds and also used as mosquito

				repellent.
Ipomoea obscura (L.) Ker.	Convolvulaceae	Pingalicha vel	Twinner Herb	Root paste is applied on dog bite.
Lannea coromandelica (Houtt.) Merr.	Anacardiaceae	Moin	Tree	Stem bark resin/ gum is used as body pain reliever.
Merremia gangetica (L.) Cufod.	Convolvulaceae	Bopali, Undirkani	Perennial Herb	Whole plant is given in Rheumatism.
Phyllanthus lawii Grah.	Euphorbiaceae	Bhui Awala	Shrub	Roots are given in fever.
Sida cordifolia L.	Fabaceae	Bala	Under Shrub	Leaves are given in Rheumatism.
Solanum xanthocarpum Schrad. & Wendl.	Solanaceae	Bhui-Ringani	Herb	Root powder used in fever.
Tinospora cordifolia (Willd.) Miers ex Hk. f. & Th.	Menispermaceae	Gulvel	Climber	Stem juice is used in jaundice.
Triumfetta rhomboidea Jaq.	Tiliaceae	Kutree	Herb	Leaf paste is applied on the eczema.
Ventilago denticulate Willd.	Rhamnaceae	Sakal vel	Shrub	Bark is given in dysentery.
Woodfordia fruticosa (L.) Kurz.	Lythraceae	Dhaiti	Shrub	Flower and barks are used in sunstroke.

Results and Discussion

The present communication deals with the local people of Arni tehasil, Yavatmal District (M. S.), India were used medicinally important plants of 15 genera and 21 species of angiosperms for different ailments. These are herb, shrub, climber, small and large trees. These plants are common and medicinally important to treat various diseases like jaundice, fever, rheumatism, dysentery, diarrhoea, eczema etc. Some theruptic uses of such plants in Arni tehasil were documented. The present information is used in drug standardization and estimation of compound content for further studies.

Conclusion

Traditional knowledge systems cure different diseases by the tribal of Arni region. They use plant as a source of drug through trial and error method and the process is experienced over

hundreds of years. It has been observed that the use of the medicinal plants is also a routine practice in the local people.

Acknowledgment

Authors are grateful to the tribal medicine men of the Arni region for sharing their traditional knowledge.

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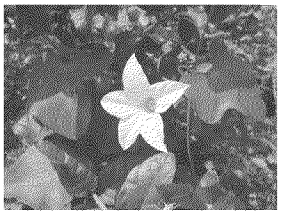
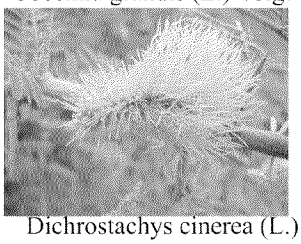
Abrus precatorius L.

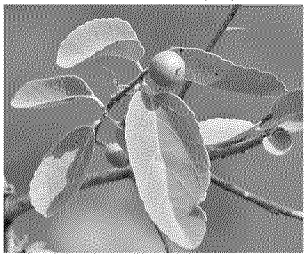


Coccinia grandis (L.) Voigt

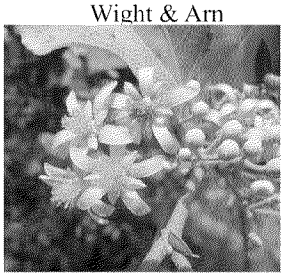
Cocculus hirsutus (L.) Diels



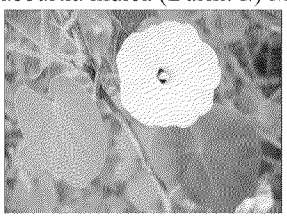
Dichrostachys cinerea (L.) Wight & Arn



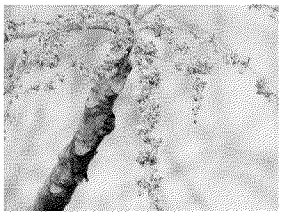
Flacourtia indica (Burm. f.) Merr.



Grewia tiliafolia Vahl



Ipomoea obscura (L.) Ker. Gawl.



Lannea coromandelica (Houtt.) Merr.

12. Effect of Gloriosa Superba Tuber on Libido in Male Albino Rats

S. R. Pare
V. S. Zade

Abstract

In the present study, we examined the aphrodisiac activity of aqueous, chloroform and alcohol extract of *Gloriosa superba* tuber in male albino rats. The libido were studied in male albino rat of control and experimental groups and compared with those administered with the standard reference drug Sildenafil citrate. Clinical toxicity symptoms such as respiratory distress, salivation, weight loss and change in appearance of hair as well as maternal mortality were not observed at any period of the experiment. The administration of 500 mg/kg body weight dose of plant extract showed increase in mounting frequency. The aqueous, chloroform and alcohol extract at the dose of 500 mg/ kg body weight had a pronounced effect on the libido.

Keywords : Aphrodisiac, *Gloriosa superba*, Male albino rat, libido, tuber.

Introduction

Plants are an important source of medicines and play a key role in the health of the world's population. In traditional medicine, a variety of plants have been used as sex stimulants [1]. For centuries, Arabs have made use of herbal drugs to improve sexual performance and increase libido[2]. In African traditional medicine, especially in Cameroon, *Zingiber officinale* and *Pentadiplan-dra brazzeana* are used as aphrodisiac and male sexual stimulation [3]. In Egypt, the pollen grains of dates (*Phoenix dactylifera*) and seeds of harmala (*Peganum harmala*) are used to restore sexual potency [4]. *Punica granatum* was a symbol of immortality and love in oriental regions [5].

Substances often used as aphrodisiac cross the blood brain barrier and mimic or stimulate some area of sexual arousal in the central nervous system. Some nutritional foods improve the well being of the individual and consequently improve sexual performance and libido. [6].

Gloriosa superba belongs to the genus *Gloriosa* of the family Liliaceae. Originally present in forest region of tropical Africa and Asia and is under cultivation in fairly large areas of India. According to Ayurveda, tuber is pungent, bitter, acrid, anthemirtic, laxative, alexiteric and

useful in ulcers, leprosy, piles, inflommations, abdominal pains, itching and thirst. *Gloriosa superba* is also claimed to be an abortifacient [7] *G. superba* tuber also shows a hepatoprotective activity [8].

However the validity of the tribal claimed aphrodisiac activity of *Gloriosa superba* has not been proven scientifically. Hence this study was carried out to provide scientific support for its purported folkloric usage.

Material and Method

Collection of plant material

The plant *Gloriosa superba* was collected from Melghat region, identified and authenticated by experts from Botanical Survey of India, Pune, where a voucher specimen with herbarium accession number (SHPAGS6) was deposited.

Animal Stock

Healthy wistar male and female albino rats of approximately 8 weeks of age and weighing 100-160 gm were purchased from Sudhakarrao Naik Institute of Pharmacy, Pusad. They were housed in a polypropylene cages, maintained at a temperature of approximately 25 ± 2 $^{\circ}$C. and a photoperiod of 12 h light and 12 h dark cycle. The animals were provided with standard pelleted diet (Trimurti Lab Feeds, Nagpur) and water *ad libitum*. They were allowed a 15 days acclimatization period before the experimental session.

All the experimental protocols were met with the approval of institutional Animal Ethics Committee with registration number (1060/ac/07/CPCSEA (IAEC/01/2009).

Preparation of plant extract

The stem and leaves of *Gloriosa superba* were collected, shade dried, cut into pieces, pulverized using an electric blender and subjected to soxhlet extraction for 24 h with distilled water (60 $^{\circ}$C), chloroform (20 $^{\circ}$C) and alcohol (20 $^{\circ}$C). The extract was evaporated to near dryness on a water bath, weighed and stored at 4°c in refrigerator until the experimental testing.

Preparation of test samples

Aqueous, chloroform and alcohol extract was suspended in 5 ml/kg of distilled water or olive oil (Figaro- refined olive oil, Spain) and administered orally. Ethinyl estradiol (cyclenorm-E –Ethinyl estradiol tablet I.P. 0.01mg) manufactured by India Nutri Pharma) 10 ug/100 g b.w. and progesterone (Susten 100- progesterone I.P.- 100mg) Sun pharmaceutical Industries Limited, Gujarat, India) 0.5 mg/100 g b. w. were administered 48 h and 4 h respectively through

subcutaneous injections. Sildenafil citrate suspension was prepared by crushing a tablet of Sildenafil citrate and administered orally at a dose of 5ml/kg in distilled water. Caverta - Sildenafil citrate IP-50mg Ranbaxy, Sirmour, India).

Treatement

The male rats were randomized into 11 groups comprising of 6 animals each. The reconstituted aqueous, chloroform and alcohol extract was administered orally using intragastric (ig) soft rubber catheter to all animals in different groups for 15 day at the doses given below.

Group I- administered with distilled water (5 ml/kg) served as control.

Group II-IV- administered with aqueous extract at the dose of 100, 250, 500 mg/kg body weight (b. w.) respectively in distilled water (5 ml/kg).

Group VI-VII- administered with daily dose of chloroform extract 100, 250, 500 mg/kg b. w. respectively in olive oil (5 ml/kg).

Group VIII-X- administered with daily dose of alcohol extract 100, 250, 500 mg/kg b. w. respectively in olive oil (5 ml/kg).

Group XI- given 5 mg/Kg b. w. of Sildenafil citrate suspension

Phytochemical analysis

The aqueous, chloroform and alcohol extract of *Gloriosa superba* were subjected to phytochemical and qualitative analysis of alkaloids, tannins, anthraquinone glycosides, saponins, phenolics, flavanoids and steroids [9].

Acute toxicity study

The healthy 60 male albino rats, starved for 3- 4 h, group I was administered with the distilled water (1 ml/rat), group II-X were administered with 1000, 2500 and 5000 mg/kg dose of aqueous, chloroform and alcohol extract and subjected to acute toxicity studies. The rats were observed continuously for 2 h for behavioural, neurological and autonomic profiles and for 24 and 72 h for any lethality or death. No death was observed at highest dose (5000 mg/kg body weight) so its one tenth (500mg/kg) used for studies as per Organization of Economic Co-operation and Development (OECD) 423 guideline [10].

Test for libido

The test was carried out by the method of Davidson [11] modified by Amine [12]. Sexually experienced male rats were divided into five groups each consisting of six rats and kept singly in separate propylene cages during the experiment. Group 1 represented the control group,

which received 5ml/kg of distilled water orally, once daily for 15 days at 18:00 h. Group II–IV received suspension of the *Gloriosa superba* extract orally at the doses of 100, 250 and 500 mg/kg, respectively, daily for 15 days at 18:00 h. Group V served as standard group and was given suspension of the Sildenafil citrate orally at the dose of 5 mg/kg, 1 h prior to the commencement of the experiment. To ensure receptivity of female rats, thus were brought to oestrus by the sequential administration of ethinyl estrodial (10 µg/100 g) and progesterone (0.5 mg/100 g) through subcutaneous injections, 48 h and 4 h respectively prior to pairing .The male rats were observed for Mounting Frequency (MF) on the evening of 15th day at 20:00 h. The penis was exposed by retracting the penis sheath and 5% xylocaine ointment (Astrazeneca-Lidocaine USP 5% w/w, Astrazeneca Pharma India Limited, Banglore, India) was applied 15 min before starting the observations. Each male rat was placed individually in a cage and the receptive female rat was placed in the same cage. The number of mountings was noted. The male rats were also observed for intromission and ejaculation.

Statastical analysis

The data are expressed as mean±SE. Statistical analysis was done by using paired and unpaired Student's t-test and one way analysis of variance (ANOVA) [13].

Result

Phytochemical screening of the aqueous, chlololform and alcohol extract of *Gloriosa superba* tuber showed the presence of alkaloids, steroid and saponins, while anthraquinone glycosides, tannins, and phenolic compound were found to be absent.

The result of the acute toxicity test shows no lethal or any treatment related effects of the extract of *Gloriosa superba* tuber in all treatment groups of animals. Clinical toxicity symptoms such as respiratory distress, salivation, weight loss and change in appearance of hair as well as maternal mortality were not observed. Similarly no changes in the behavioural and neurological profiles were observed in treated groups of the rats up to highest dose of 5000 mg/kg body weight. Hence one- tenth of this dose was used for further testing.

The test for libido showed that the *Cissus quadrangularis* aqueous, chloroform and alcohol extract at the dose of 500 mg/kg body weight increased the mount frequency (MF) in a significant manner ($F=58.55, F=41.10, F=32.23$ at $P<0.01$) resp. Among the three extract (aqueous, chloroform and alcohol) treated groups the aqueous extract (500 mg/kg b.w.) showed

highly significant effect (Table 1). However no intromission and ejaculation were observed in all the three extract treated group.

Table 1: Effect of aqueous, chloroform and alcohol extracts of *C. quadrangularis* on libido in male rats

Treatment groups	Doses (mg/kg body wt.)	Mounting frequency (MF)	Intromission frequency (IF)	Ejaculation (EJ)
Control (Group I)	Vehicle	1.16±0.91	Nil	Absent
Aqueous extract (Group II-IV)	100	2.83±0.23***	Nil	Absent
	250	3.66±0.26***	Nil	Absent
	500	6±0.30***	Nil	Absent
Chloroform Extract (Group V-VII)	100	2.16±0.34***	Nil	Absent
	250	3.83±0.23***	Nil	Absent
	500	5.16±0.23***	Nil	Absent
Alcohol extract (Group VIII-X)	100	2±0.23*	Nil	Absent
	250	2.66±0.26*	Nil	Absent
	500	4.16±0.23***	Nil	Absent
Sildenafil citrate (Group XI)	5	2.33±0.26***	Nil	Absent

P values: *** <0.1, **<.0.01, ***<0.001, when compared with control. Values are mean±S.E. n=6.**

Disscussion

Gloriosa superba tuber has been used by the tribals of Melghat region as a sexual stimulator even without any scientific validity. Hence this study was carried to validate scientifically the tribals claim.

In the present study after administration of *Gloriosa superba* tuber (aqueous, chloroform and alcohol) extract (500 mg/kg b.w.) to male rats there was increase in libido (mount frequency (MF) ($P<0.001$) after genital anesthetization as compared to control. Similar results were obtained by chloroform, methanol, water and butanol fraction of *Eurycoma longifolia*, providing evidence that *Eurycoma longifolia* jack enhanced the libido in sexually experienced male rats,

which was found to be a potent stimulator of sexual arousal in intact, sexually vigorous male rats in the absence of feedback from genital sensation [14].

Similar results were also obtained after administration of *Psoralea carylifolia* seed to male rat at the dose of 100, 200 and 400 mg/kg significantly showing the increase in mounting frequency after anesthetization ensuring pure libido[15]. *Myristica fragrans* houtt (nutmeg) at the dose of 100, 250, 500 mg/kg significantly increased the mounting frequency ($P<0.001$) as compared to control group [16].

The effect of aqueous, alcohol and chloroform seed extract of *Moringa oleifera* at the dose of 100, 200 and 500 mg/kg on libido was studied by assessing the MF after genital anaesthetization which does away with the reinforcing effect of genital sensation, thus affording study of pure libido[17].

Conclusion

In conclusion, the study validates the effectiveness of herb in improving libido. The 500 mg/kg dose of aqueous extract showed pronounced effect on mounting frequency ensuring the pure libido effect of the extract.

Acknowledgement

The authors are grateful to Committee for the Purpose of Control and Supervision of Experiments on Animals (CPCSEA), Chennai, Ministry of Justice and Empowerment, Government of India and Institutional Animal Ethical Committee, Government Vidarbha Institute of Science and Humanities, Amravati (M.S) for giving the permission for doing the experimental work on rats.

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13. In-Vitro Aldose Reductase Inhibitory Activity Studies of Azadirachta Indica Fractions

Mohasim M. Patel
P. A. Kulkarni

Abstract

Cataract, a visual impairment causing disturbance in lens transparency occurs mainly due to optical dysfunction of crystalline lens which leads to blindness. Diabetic complication is the root cause of cataract. Aldose reductase is the principle enzyme that catalyzes the reduction of glucose to sorbitol in polyol pathway has been reported to play an important role in sugar-induced cataract. In the present investigation, the fresh leaves of *Azadirachta indica* were dried and extracted using 75% ethanol: water and fractions studied the aldose reductase *in-vitro* inhibitory activity. Out of 18 fraction 04 fractions were showed the significant (>80%) inhibition against the aldose reductase enzyme. *Azadirachta indica* is useful traditional medicinal plant which contains pharmacologically active constituents; that may be helpful in treatment of cataract.

Keywords: Catract, *Azadiracta indica Leaves,* extraction, Enzyme Isolation, In-vitro ARI activity.

1. Introduction

Cataract is leading cause of blindness, with several risk factors. Diabetes has one of the major risk factors of cataract [1]. Aldose reductase (AR) (EC 1.1.1.21) is the principle enzyme that catalyzes the reduction of glucose to sorbitol in polyol pathway [2]. Normally less than 3% of glucose turns in polyol pathway for glucose metabolism but in hyperglycemic condition more than 30% of glucose under goes polyol pathway and results in the accumulation of sorbitol in various tissues [2-5].This excessive sugar alcohol accumulation in tissues leading to osmotic swelling and the production of oxidative stress that result the causation of cataract and other related diabetic complications [6]. Hence, AR inhibition has been identified as one of the alternative target for designing novel Cataract agent from traditional medicinal plants. The amount of free radicals generated in Cataract and diabetes mellitus are severe because of an

increase in the protein glycation, glucose autooxidation, and excess accumulation of sorbitol in cells [6].

Medicinal plants as potential source of bioactive compounds [7-9] are considered to be a source for the most active, potent nontoxic, antidiabetic hypoglycaemic properties with lesser side effects than synthetic drugs [10-12]. Results of the present study strongly support the possibility of this herbal combination in humans to meet the objective of achieving a holistic amelioration and cure of diabetes. *Azadirachta indica* has representing numerous chemical compounds with their consistent use in the treatment of diabetes [13].The bark, leaves, fruits and flowers of *Azadirachta indica* content Flavonoids, flavonoglycosides, dihydrochalcones, tannins and others are important constituents for the biological activities and medicinal properties [14, 15]. Thus in the present report we extracted these ingredients using the 75% ethanol: water and showed the anti aldose activity of fractions. The use of medicinal plant extract could be helpful the against the Cataract treatment.

2. PRESENT WORK

2.1 Materials and Methods

2.1.1 Collection of plant materials

Leaves were collected from the healthy and uninfected *Azadirachta indica* tree. Leaves washed with clean tap water and air dried under shadow for 3-4 days, then crushed in mortar and pestle to obtained fine powdered material.

2.1.2 Chemicals used

Chemicals and standard were obtained from Sigma-Aldrich, USA and Hi-Media laboratory Pvt. Ltd. India. Other reagents and solvents were of analytical grade.

2.2 Extraction and fractionation of *Azadirachta indica*

The dried leaves powder of *Azadirachta indica* extracted in 75% ethanol: water for 72 hrs by Soxhlet apparatus and filtered to remove the vegetative residue, the collected extract was concentrated on rota-evaporator and dried for further use. A glass column was used for the fractionation of *Azadirachta indica* with 300 g of silica get 100-200. To facillate the adsorption of the crude extract to the silica gel , 8 g of the extract was solubilized in dichlomethane and the 15 g of silica was added while mixing, producing a paste. The mixture was air dried overnight and carefully loaded to the column. The column was the started with petroleum ether and the solvent was collected with 25mL test tube. The gradient of the mobile phase, petroleum ether-

ethyl acetate and Ethyl acetate–methanol was adjusted after every 100mL. A total of 163 elutes were collected and pooled based on their TLC profiles. Finally, 18 fractions were obtained from the pooled elutes and dried. The dried weight of each fraction was recorded and the fractions were stored in dry cool conditions.

Table: 1 Fractionation by open column chromatography of crude extract from the leaves of *Azadirachta indica.*

Mobile Phase	Proportions in % w. r. t. to EtOAc/MeOH	Elutes	Pooled Fractions	Codes
Pet Ether	0	1-13	1-13	F-1
Pet Ether-EtOAc	5	14-20	14-20	F-2
Pet Ether-EtOAc	10	21-32	21-32	F-3
Pet Ether-EtOAc	20	33-41	33-48	F-4
Pet Ether-EtOAc	30	42-48	49-56	F-5
Pet Ether-EtOAc	40	49-56	57-67	F-6
Pet Ether-EtOAc	50	57-67	68-79	F-7
Pet Ether-EtOAc	60	68-73	80-91	F-8
Pet Ether-EtOAc	70	74-79	92-102	F-9
Pet Ether-EtOAc	80	80-84	103-110	F-10
Pet Ether-EtOAc	90	85-91	111-117	F-11
EtOAc	100	92-96	125-129	F-12
EtOAc-MeOH	5	97-102	130-132	F-13
EtOAc-MeOH	10	103-110	133-136	F-14
EtOAc-MeOH	20	111-117	137-140	F-15
EtOAc-MeOH	30	118-124	141-146	F-16
EtOAc-MeOH	40	125-129	147-154	F-17
EtOAc-MeOH	50	130-132	155-163	F-18
EtOAc-MeOH	60	133-136		
EtOAc-MeOH	70	137-140		
EtOAc-MeOH	80	141-146		
EtOAc-MeOH	90	147-154		
MeOH	100	155-160		

2.3 Isolation and purification of aldose reductase enzyme from bovine lens:

Isolation and purification procedure of enzyme with some modification was followed according to Hayman and Kinoshita [16]. Bovine lenses were obtained from a local abattoir soon after slaughtering and the lenses were washed with distilled water and kept in it frozen condition

until needed. Lenses were homogenized in 3 volumes of phosphate buffer (pH =6.2) in a tissue homogenizer. The contents were subjected to centrifugation at 10,000×g for 20 minutes. After centrifugation, supernatant was collected and insoluble material was discarded. Saturated ammonium sulphate was added to the supernatant up to 40% saturation. After the thick suspension had been allowed to stand with occasional stirring for 20 minutes to ensure the completeness of precipitation, it was centrifuged and the supernatant was collected and the precipitate was discarded. After 40% saturation of ammonium sulphate treatment, additional inert protein was removed by increasing the ammonium sulphate concentration up to 50% saturation. Thereafter, the content was subjected to centrifugation and the procedure was repeated with 75% saturation of ammonium sulphate. Then the precipitated enzyme was dissolved in 0.05M sodium chloride solution. This dissolved enzyme was dialyzed overnight to increase the specific activity of the purified enzyme. The dialyzed enzyme solution was absorbed on DEAE-cellulose column and the column was eluted with 0.01M phosphate buffer until the absorbance at 280 nm of the eluate was less than 0.1. The elution of the enzyme was accomplished with a linear gradient all operation is performed at 15-20^{o}C.

2.4 Bioassay

Bioassay of different fractions for ARI activity was done as described earlier [16-20]. Bioassay solutions of plant extract were prepared by dissolving 20 mg of the plant extract in 500µL DMSO and 500µL phosphate buffer pH=6.2. The reaction mixture was prepared at 20°C with a total volume of 3mL containing 0.40M lithium sulphate, 5×10-4M dl-glceraldehyde, 5×10-5M NADPH, phosphate buffer pH 6.2 enzyme solution. DL-glyceraldehydes substrate with or without plant extract. The reaction was initiated by addition of NADPH and continued up to 2 minutes absorbance reading was taken at 340nm. Quercetin a known aldose reductase inhibitor was used a positive control to compare the plant extract inhibitory activity [18]. A negative control was prepared using 5% DMSO in phosphate buffer pH=6.2. Finally, the inhibitory activity of the extract was calculated by using the following formula:

$$\% \text{ ARI} = \frac{\triangle \text{Abs (Neg.Ctrl.)} - \triangle \text{Abs (Extract)}}{\triangle \text{Abs (Neg.Ctrl.)}} \times 100$$

3. Result and discussion

The extraction yields of each fraction of *Azadirachta indica* are shown in table 2. The yield of each fraction components relative to the weight of dried plant material ranged from 4 mg to 1.698 gm. It was observed that the fraction F17 shows the higher yield and fraction F10 shows the least yield. The inhibition assay studies examined *in-vitro* by using 20 µg /mL concentration for all fractions. All fractions showed an inhibition greater than 40% and the eight fractions showed the significant inhibition greater than 75%, whereas fraction F10, F11, F12 are not showed inhibitory activity against the AR (Table-2). The ability to inhibit the activity of aldose reductase may be due to presence of phenolic compounds and flavonoids are very important constituents of plants. From the inhibition ARI data, it was found that fraction seventeen and eighteen were showed potent inhibition compared to standard drug Quercetin.

Table 2: *In-vitro* AR inhibitory activity

Fractions	Weight of fraction in mg	% ARI Inhibition at 20µg/mL	Fractions	Weight of fraction in mg	% ARI Inhibition at 20µg/mL
F1	65	44.20	F11	4	Not detected
F2	225	58.30	F12	3	Not detected
F3	163	59.30	F13	577	54.30
F4	138	77.60	F14	1278	80.50
F5	210	76.30	F15	649	80.30
F6	324	78.79	F16	575	75.01
F7	106	40.01	F17	1698	80.79
F8	39	42.10	F18	348	80.03
F9	55	44.30	Quercetine		84.32
F10	0.004	Not detected			

The results were compared with the standard drug quercetin which showed 84.32% inhibition at 20µg/mL.

4. Conclusion

Azadirachta indica selected for this study based on their antidiabetic potential determined in previous studies, showed a relatively wide range of AR inhibition, thereby suggesting a pharmacological basis for their selection in traditional use. *Azadirachta indica* exhibited relatively better levels of ARI potential may be due to the higher concentration of phenolic compounds and flavonoids that is contained within. Diabetic catractogenesis oxidative stress are

driven, *Azadirachta indica* plant material can play an important role in slowing down their detrimental progression and therefore, be used as complimentary or alternative herbal medicine which has lesser side effect.

5. Acknowledgements

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14. On Fungal Spores from the Deccan Intertrappen Bed of Mohgaonkalan

A. D. Chudiwale
Amolokchand Mahavidyalaya Yavatmal Maharashtra.

Abstract

The Present fungal spores, from Deccan Intertrappean Beds of India, are quite different from the known fossil fungal spores as it does not resemble with any of the known fossil records from this bed. The spores are multi cellular, cells are placed end to end, club shaped with smooth wall. The mycelium is septate and branched. On tracing affinities it come much closer to Seimatosporium corda hence kept under Seimatosporium as its extinct species Seimatosporium intertrappeum.

Key Words : Fungus saprophytic, hyphae branched, septate, hyaline, epispore smooth, Seimatosporium.

Introduction

The present petrified fossil fungus was discovered in a black piece of chert collected from the Intertrappean beds of Mohgaonkalan. Different types of spores are known from this locality but the present form is totally different thus has formed the subject matter here.

Material and Method

A black piece of chert after etching exposed a decayed plant tissue, series of peel sections revealed many four celled spores scattered inside.

Description

The spores are distributed irregularly in nearly all the parts of the host tissue (Pl. Fig. 1). Due to the complete distraction of the host tissue, the cellular details and the nature of the host could not be ascertained. The spores are completely burried in the host tissue, reddish brown in colour and are four celled (Pl.Figs.2,4). All the four cells are arranged in a manner so as to give a elongated club shaped appearance and measure about 26 pm to 35 pm in length . The lowermost cell is hyaline and smaller 7 pm t o 8 pm in size while the uppermost cell is biggest 11 pm to 13 pm in size. Filled with dark content , spore wall is smooth and 2 pm thick . Some spores are also seen germinated (P1.Fig. 3)

Mycelium is also seen at places (P1. Fig.3). It is branched and septate. The cells are much mo re elongated and placed end to end . The width of hyphae ranges from 2.5 mm to 4 pm.

Identification

The above fossil fungus shows branched septate mycelium. The spores are club shaped, elongated four celled and the lower most cell is hyaline .These characters are not seen in previou sly known fossil forms . Hence its affinities are traced with the modern genera With the living forms, it comes closer to the Deuteromycetes as it shows branched septate my celium. Further the characters like club shaped elongated spore and lower hyaline cell, keep it closer to Helmint hosporium. But in Helminthosporium, the middle cells of the spore again show partition wall due to which it becomes many celled, however in the present case no such septation is seen, all the four cells lie end to end without partition in the cells. Further the shape and the size of the spore keep it more closer to the Seimatosporium Corda., as both shows club shaped elongated spore and the size of the spore also ranges from 25 pm to 40 pm. Moreover, it is also four celled, but both the end cells are hyaline in Seimatosporium while in present case only one end cell is hyaline.

It is evident from the above discussion that the present fossil form does not resembles any of the previously known fossil and modern genera, but does show some affinities towards Seimatosporium Corda. Hence it is kept under Seimatosporium as its extinct species Seimatosporium intertrappeum sp.nov. The specific name is after the intertrappean horizon from which the specimen was collected.

Diagnosis

Seimatosporium intertrappeum sp. nov.

Fungus saprophytic, hyphae branched, septate, cells 2.5 pm to 4 pm wide, spores elongated club shaped, 26 pm, 35 pm in size, lower cells hyaline smaller 7 pm to 8 pm while the upper cell is biggest 10 pm to 15 pm in size. Epispore smooth 2 pm thick.

HOLOTYPE : ADC-4/slide 1-4, deposited at the Department of Botany, Institute of Science, Nagpur.

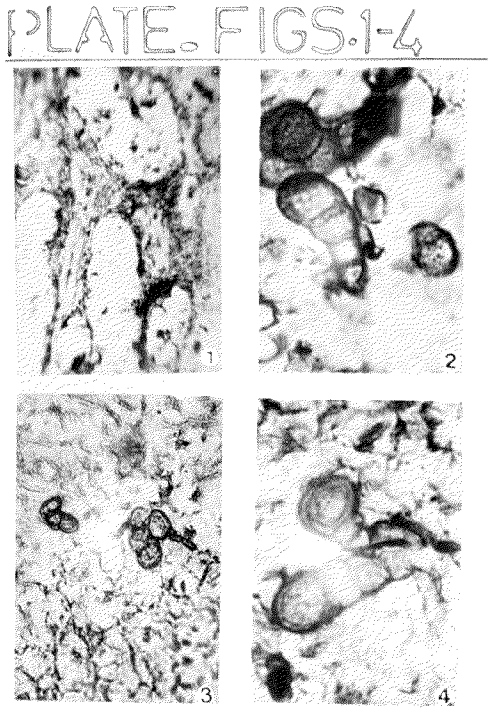
LOCALITY : Mohgaonkalan, Chhindwara District, M.P., India.

HORIZONE : Deccan Intertrappean Beds of India.

AGE : Eocene.

Explanation Of Plate Figs. 1-4

1. Host tissue infected with fungus X 50 .
2. Spore enlarged showing lower smaller hyaline cell and upper larger cell X 450 .
3. Spore germinating and branched mycellium X 200 .
4. Two spore enlarged showing exosporium X 450 .



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15. Chromosomal Study of Gloriosa Superba, a Threatened Medicinal Plant

Kahate P. M.
Assistant Professor, Department of Botany, Phulsing Naik Mahavidyalaya, Pusad, Dist. Yavatmal, Maharashtra.

Abstract

Gloiosa superba L. is an important medicinal herbal plant found all over the India. It is a threatened species because of large scale uprooting for pharmaceutical uses. In natural populations of plant species there is presence of polyploids rather than the diploid plants; while the polyploidation is depends on the numerical and structural variations in the chromosome. Hence there is need of *in vivo* chromosomal study of *G. superba* for finding of any change in the nature of chromosome in the cell division like, stickiness, bridges, lagards or any other type of variations. The present study deals with the chromosomal analysis of *G. superba*.

Keywords: Chromosome, *Gloriosa superba*, threatened, irregularities.

Introduction

Gloriosa superba is belonging to family Liliaceae commonly known as 'Glory lily'. It is widely distributed in the tropical and subtropical parts of India, Ceylon, Tropical Africa, Malacca (Cook 1958, Hooker 1894) up to an altitude of 2000 m. Once a very common plant on the bordering low hills of Satpura, Melghat forest of Amravati District facing the plains and in Pohra hills. All parts of the plant are poisonous and the tubers particularly so, since they contain the toxic alkaloid colchicine. Plant population of this plant has decreased considerably in the last 10 years due to clearing of supporting vegetation (Dhore 1986). Colchicine is the important alkaloid extracted from the seed and used in modern medicine. Indiscriminate exploitation of this plant to meet ever-increasing demand of Indian industry has depleted its natural source (Singh 1999). This species has gained much more importance in pharmaceutical industry during last 4 decades resulting indiscriminate exploitation of its natural source. If the present rate of demand for rhizome continues, the pressure of exploitation from the interior forest areas will increase as soon as the availability from the easily accessible area diminishes. As colchicine is used in induction of colchiploidy in plant breeding programme and it is an important drug of

pharmaceutical industry, resulted in indiscriminate exploitation of its natural population during the last 4 decades (Bennet and Gaur 1983).

The seeds are a rich source of Colchicine and Gloriosine (Farooqi *et al.* 1993). In scorpion and centipede stings and bites, relief is obtained from the pain by applying a paste of the root rubbed up with cold water and then warming the part affected over the fire (Mhaskar et al. 2000). The chromosome complement of diploid *G. superba* was found to be 2n = 22 (Tjio 1948; Darlington and Wylie, 1955; Tarar and Vishwakarma, 1995). The main objective of present study is to perform squashing of young root tips for confirming chromosome number and determining mitotic frequency and irregularities in cells.

Materials and methods

Tubers of *G. superba* were collected from Melghat Tiger Reserve forest of Amravati District and adjoining hilly region of Amravati in last week of June and in first week of July. They were established and maintained in Botanical Garden of Botany Department. The roots tips of regenerated plants (Fig. a) were collected from *in vivo* germinating tubers during morning hours (8.00 am to 9.oo am). They were washed thoroughly in distilled water. After washing with sterile distilled water they were fixed in Carnoy's fluid I (3 alcohol: 1 acetic acid) for 24 hrs and preserved in 70% alcohol. Squash preparations were made after hydrolysing with 1 N HCl for 5-6 min at 58°C. The root tips of *in vivo* material were stained with 1% acetocarmine for 5 min and squashed at room temperature. Temporary preparations of root tip cells were made and photomicrograph was taken with the help of Trinocular microscope (Carl Zeiss). Calculations were made by using following formula,

$$\text{Active mitotic frequency (\%)} = \frac{\text{Equatorial Metaphase + Anaphase}}{\text{Total number of cells scored}} \times 100$$

$$\text{Mitotic abnormality (\%)} = \frac{\text{Total number of abnormalities}}{\text{Total number of cells scored}} \times 100$$

$$\text{Mitotic frequency (\%)} = \frac{\text{Number of metaphase}}{\text{Total number of cells scored}} \times 100$$

Phases (e.g.) Metaphase

Results and Discussion

The present mitotic activity of cell division in *G. superba* was recorded at 8.30 am; root tips hydrolyzed best at 58°C for 5 – 6 min; staining with 1% aceto- carmine for 5 min produced excellent results. Tarar and Vishwakarma (1995) got peak mitotic activity at 8.30 am; hydrolysis for 10 min at 60°C and mordanting with 4% iron alum and then staining with 0.5% alcoholic haematoxylin gave excellent results. It appears that hydrolysis for 5 -6 min at 58°C was most suitable for getting fine staining results either with haematoxylin (0.5 %) after mordanting or aceto-carmine (1%) rather than the procedure followed by the above author.

Fig. a: A twig of *G. superba*

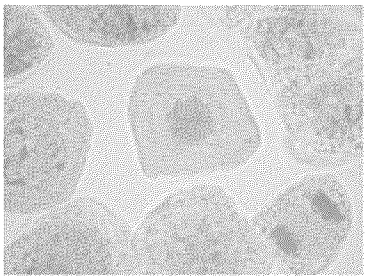

Fig. b: Sticky metaphase

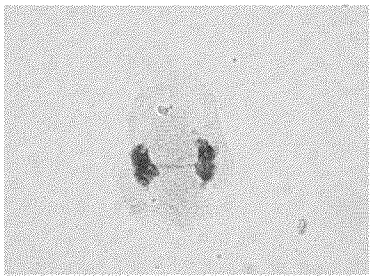

Fig. c: Anaphasic bridge

Frequency of individual stages and abnormalities in five randomly selected root tips is shown in Table 1. Frequency of polar and equatorial metaphases was 1.25-2.73% and 0.89-2.19% while those of anaphases and telophases scored as 1.12-2.50% and 0.69-1.56%. Two types of abnormalities were found i.e., sticky metaphases (Fig. b) and anaphasic bridges (Fig. c). The sticky metaphases and anaphasic bridges were observed in the range of 0.17-0.64% and 0.0-0.32%. The active mitotic frequency of dividing cells (equatorial metaphases + anaphases) was 2.92% and abnormalities (sticky metaphase + bridges) appeared to be 0.32%. Anaphase analysis (bridges, fragments, laggards, unequal distribution of chromatids revealed number of anomalies which would led to the production of aneuploid cells in *Haplopappus gracilis* calli (Singh, 1976).

Table1: Frequency (%) of normal and abnormal cells in *in vivo* root tip studies in *G. superba*

	Frequency of mitosis (no / %)					Mitotic abnormalities (no / %)	
Root	Cells scored	Met. Pol.	Met. Equ.	Ana.	Tel.	Met. (stk.)	Ana. (bdg)
1st	559	7(1.25)	5(0.89)	8(1.43)	6(1.07)	1(0.17)	--
2nd	518	7(1.35)	7(1.35)	7(1.35)	6(1.15)	--	--
3rd	431	10(2.32)	4(0.92)	6(1.39)	3(0.69)	--	--

4th	639	11(1.72)	14(2.19)	16(2.50)	10(1.56)	2(0.31)	--
5th	621	17(2.73)	7(1.12)	7(1.12)	6(0.96)	4(0.64)	2(0.32)

Met = Metaphase, Equ = Equatorial, Pol = polar, Ana = Anaphase, Tel = Telophase, stk = Sticky, bdg = bridge

Table 2: Frequency (%) of abnormalities among dividing cells

Root Number	Dividing cells	Met. Stk.	Ana. bdg.
1st	27	1(3.70)	--
2nd	27	--	--
3rd	23	--	--
4th	53	2(3.77)	--
5th	43	4(9.30)	2(4.65)

When mitotic analysis of individual roots were studied (Table 2), it is recorded that root 5th exhibited maximum frequency of polar metaphase (2.73%) while root 4th exhibited maximum frequency of anaphases (2.50%), equatorial metaphases (2.19%) and telophases (1.56%) as well as highest abnormalities of sticky metaphases was found in root 5th (0.64%) and anaphasic bridges (0.32%). Root 4th in this respect was second highest. It appears that frequency of all the 4 stages in root 1st, 2nd and 3rd have gone down with respect to those of roots 4th and 5th. From these observations it appears that the frequency of dividation depended upon growth differentiation, cutting time and time of fixation in different roots; further is higher the frequency of mitosis more will be the frequency of abnormalities. Radic *et al* (2005) supported present findings that since chromosome fragments were noticed only in a few cells anaphase and telophase bridge probably resulted from stickiness. Cooper *et al.* (1964) estimated that some of the chromosomes apparently become "sticky" and the daughter chromosomes fail to separate at anaphase in some mitotic configurations, whereas in the majority, they separate in a normal manner give support to the present work. Fragmentation and chromosomal bridges in anaphase and telophase stages were seen in a number of cells. Such abnormalities in terms of percentage were few. Structural rearrangements had occurred as a result of breaks in chromosome and subsequent reunion of the broken ends producing cells with altered chromosome complements (Venketeswaran, 1963).

Acknowledgement

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16. Diversity of Perennial Angiosperms At LIT Campus, Nagpur, Maharashtra

P. V. Gadkar
N. M. Dongarwar

Abstract

The present survey deals with the floristic diversity of Laxminarayan institute of Technology Campus with reference to the perennial angiosperms such as trees, shrubs, woody climbers and some perennial herbs. In cities, urban green spaces are of great importance because of the multiple ecosystem services they provide. The biodiversity of campus is important as it is vital that native and endemic species of flora are conserved. The Present study documents a total of 104 species distributed in 89 genera, representing 39 families of angiosperm perennials. Among these trees were dominant having 56 species followed by shrubs having 32 species, climbers with 11 species and 5 species.

Keywords: Perennials, floristic diversity, conservation, Green space.

Introduction

India appears to be a favoured child of nature, a land where most varied types of plants are to be found[9]. Documenting the distribution of biodiversity is the first and most fundamental step for effective conservation and sustainable utilization of natural resources for the future. Floristic diversity refers to the variety and variability of plants in given region.

Floristic study and diversity assessments are necessary to understand the present diversity status and conservation of biodiversity. Floristic explorations and taxonomic studies can provide efficient and convenient information about the nomenclature, distribution, ecology, utility of various plant species, and thus about an ecosystem[3]. Within urban ecosystems, themes like the flora in and around human settlements have been in the lime light in recent decades. Floristically, cities have been observed to be richer than adjoining areas owing to high habitat heterogeneity as well as the presence of exotic species[1]. In cities, urban green spaces are of great importance because of the multiple ecosystem services they provide and may exist in the form of domestic, public or botanical gardens, unused fields, woodlands, campuses of educational institutes or urban forests/ wildscapes[6]. Therefore an attempt has been made to study the plant species present

in the campus. The present survey deals with the floristic diversity of Laxminarayan institute of Technology Campus with reference to the perennial angiosperms such as trees, shrubs, woody climbers and some perennial herbs. Trees are an important part of every community. Our avenues, parks, playgrounds and educational campuses are lined with trees that create a peaceful, aesthetically pleasing environment. Shrubs are woody plants of relatively low height. Shrubs are also the important component of plant community which forms background or understory canopy. A liana is a woody climber that generally has roots in woodland or forest floor but its leaves often in full sun, blanketing canopies of trees, often many meters from the ground[2].Woody climbers, twiners and lianas are components of vegetation and play a crucial role to maintain the diversity of the particular area. Ascending from the forest floor to the canopy with the help of thorns, adhesive hairs and roots, lianas provide essential food and much needed canopy structure to forest animals. Some Perennial herbs are grown as ornamental plants in gardens.

Study Area

Laxminarayan Institute of Technology is one of Premier Institute in Nagpur established in 1942 and celebrating its Platinum Jubilee in 2017. LIT Nagpur covers 78 acres of area in western part of Nagpur formerly known as Telankhedi region near Amravati road. LIT Campus also includes Rajiv Gandhi biotechnology centre, Magnetic Observatory, Gurunanak Bhawan, Post graduate upper boys hostel under Rashtrasant Tukadoji Maharaj Nagpur University.

The study area has well demarcated four seasons as a hot summer, heavily raining monsoon, a brief autumn and a mild winter. The area has sub tropical climatic conditions with ample rainfall in the monsoon resulting in a rich diversity of vascular plants.

Materials and Methods

The present floristic exploration began during rainy season in July 2016 till summer season of May 2017. The present investigation was divided into two sections.

a) Primary data- The preliminary data was obtained from extensive and intensive field surveys was done in morning and evening hours twice a week. During every visit, as many specimens as possible were collected and brought to laboratory for observation. Plant specimens were identified with help of standard regional floras (Flora of Maharashtra State, Singh et al[8], Flora of Nagpur district, Ugemuge N.R.[9], Flora of Kolhapur district, Yadav and Sardesai[10]) Cultivated and Ornamental garden exotics were confirmed from online database of Indian biodiversity portal, Flowers of India and also from experts (acknowledged). After identification plant specimens were pressed with standard protocols and mounted on standard herbarium sheets and labeled and preserved at the Post Graduate Teaching Department of Botany, Rashtrasant Tukdoji Maharaj Nagpur University, Nagpur.

b) Secondary data- Literature surveys were carried out and publications those mentioned floristic diversity were extracted and cited. A comprehensive checklist was drafted from uniting all data from field notebooks and observations studied during exploration. Final list of about 104 species of trees, shrubs, climbers and perennial herbs was compiled.

Results and Discussion

The Present study documents a total of 104 species distributed in 89 genera, representing 39 families of angiosperm perennials arranged as per Bentham and Hooker's system of classification (Table 1). Out of these 39 families of angiosperm perennials 36 families are of dicotyledones and 3 are of monocotyledons. Dicotyledonous perennials are dominant with 92.30 % of total species while remaining 7.69 % are of monocotyledonous perennials. The Perennial plants recorded in study area were broadly divided into into trees, shrubs, climbers and perennial herbs. The higher percentage of trees (55%) in study area can be attributed to edaphic and climatic conditions and also due to plantation in campus. The dominant tree species are *Acasia leucophloea, Acasia nilotica, Cassia siamea, Prosopis juliflora, Albizia lebbeck, Albizia procera, Leucaena latisiliqua, Dalbergia sissoo.*

Table 1: Enumeration of Perennial plant species according to Bentham and Hooker's system of classification

Sr. No	Families	Plant Species	Local Name	Habit	Flowering and Fruiting period
1	Annonaceae	*Annona squamosa*	Sitaphal	Shrub	May-Oct.
		Polyalthia longifolia	Ashok	Tree	May-June
2	Menispermaceae	*Tinospora cordifolia*	Gulvel	Climber	July-Oct.
3	Capparaceae	*Capparis zeylanica*	Waghati	Climber	Oct.-Mar.
4	Bombacaceae	*Bombax ceiba*	Katesawari	Tree	Feb.-Apr.
		Ceiba pentandra	Samali	Tree	Jan.-Mar.
5	Malvaceae	*Hibiscus rosa-sinensis*	Jaswand	Shrub	throughout
6	Sterculiaceae	*Sterculia foetida*	Jangali-badam	Tree	Mar.-Nov.
		Sterculia urens	Karai,Karu	Tree	Apr.-May
7	Tiliaceae	*Grewia tiliifolia*	Dhaman	Tree	Apr.-Sep.
8	Malpighiaceae	*Galphimia gracilis*	Rain of gold	Shrub	Nov.-June
9	Rutaceae	*Murraya koenigii*	Kari-Patta	Shrub	Feb.-June
10	Simaroubiaceae	*Ailanthes excelsa*	Maharuk,Ghodlimb	Tree	Jan.-Mar.
11	Meliaceae	*Azadirachta indica*	Kaduneem	Tree	Feb.-May
12	Rhamnaceae	*Ziziphus mauritiana*	Bor,Ber	Tree	Apr.-Oct.
		Ziziphus oenoplia	Yeruni	Shrub	Aug.-Nov.
13	Sapindaceae	*Sapindus emarginatus*	Ritha	Tree	Oct.-Feb.
14	Anacardaceae	*Mangifera indica*	Amba, Aam	Tree	Jan.-May
15	Moringaceae	*Moringa oleifera*	Shevga	Tree	Jan.-May
16	Mimosaceae	*Acasia catechu*	Khair	Tree	Jun.-Dec.
		Acasia leucophloea	Hivar	Tree	Aug.-Nov.
		Acasia nilotica	Babul	Tree	Jan.-Apr.
		Albizia lebbeck	Shirish	Tree	Mar.-Aug.
		Albizia procera	Pandharasiris	Tree	May.-Sep.
		Calliandra haematocephala	Red powderpuff	Shrub	Nov.-Feb.
		Leucaena latisiliqua	Su-Babhul	Tree	Oct.-Jan
		Parkia biglandulosa	Chenduphul,Gongstick tree	Tree	Feb.-Apr.
		Pithocellobium dulce	Vilayati chinch	Tree	Jan.-June
		Prosopis juliflora	Bangali babhul	Tree	Apr.-Oct.
		Samanea saman	Rain tree	Tree	May.-Sep.
17	Caesalpinaceae	*Bauhinia racemosa*	Apta	Tree	Apr.-July
		Caesalpinia bonduc	Sagargota	Climber	July-Jan.
		Cassia fistula	Bahawa	Tree	Mar.-July
		Cassia Javanica	Java Cassia	Tree	May.-Sep.
		Cassia siamea	Siamese senna	Tree	Sep.-Jan.
		Delonix regia	Gulmohar	Tree	Apr.-June
		Hardwickia binata	Anjan	Tree	July-Aug.
		Peltophorum pterocarpum	Peelagulmohar	Tree	Aug.-Dec.
18	Fabaceae	*Butea monosperma*	Palas	Tree	Feb.-Apr.
		Cajanus cajan	Tur	Shrub	Oct.-Feb.

		Dalbergia latifolia	Pahari sheesham	Tree	Sep.-Feb.
		Dalbergia sissoo	Sheesham	Tree	Mar.-Feb.
		Erythrina suberosa	Pangara	Tree	Feb.-Apr.
		Gliricidia sepium	Mexican lilac	Tree	Feb.-June
		Milletia peguensis	Moulmein Rosewood	Tree	Feb.-Oct.
		Pongamia pinnata	Karanj	Tree	Feb.-May
		Sesbania grandiflora	Heti	Tree	Nov.-Mar.
19	Combretaceae	*Combretum ovalifolium*	Piwarbel,Madbel	Climber	Feb.-Apr.
		Terminalia catappa	Deshibadam	Tree	Apr.-Oct.
20	Myrtaceae	*Callistemon citrinus*	Bottle brush	Tree	Oct.-Feb.
		Eucalyptus globules	Nilgiri	Tree	Dec
		Syzygium cumini	Jambhul	Tree	Apr.-July
21	Lythraceae	*Lagerstroemia speciosa*	Chota bondara	Shrub	Mar.-May
		Woodfordia fruticosa	Dhayti	Shrub	Jan.-Apr.
22	Carricaceae	*Carrica papya*	Papai	Tree	Sep.-Jan.
23	Araliaceae	*Polyscias crispatum*	Aralia	Shrub	Not Seen
		Polyscias scutellaria	Plum aralia	Shrub	Not Seen
24	Rubiaceae	*Anthocephalus cadamba*	Kadamba	Tree	Dec.-Mar.
		Gardenia resinifera	Dikemali	Shrub	Mar.-Aug.
		Hamelia patens	Firebush,Muna	Shrub	May-Oct.
		Ixora coccinea	Lokhandi	Shrub	Throughout
		Mitragyna parviflora	Karam	Tree	May-Sep.
25	Nyctanthaceae	*Nyctanthus arbor-tristis*	Parijatak	Shrub	June-Dec.
26	Apocynaceae	*Alstonia scholaris*	Saptaparni	Tree	Dec.Feb.
		Nerium indicum	Kanher	Shrub	Throughout
		Plumeria rubra	Chapha	Tree	Throughout
		Rauvolfia tetraphylla	Barachandrika,Milkbu sh	Shrub	Throughout
		Tabernamontana divaricata	Swastik,Tagar	Shrub	Throughout
		Thevetia peruviana	Pivala Kanher	Shrub	Throughout
27	Asceipiadaceae	*Calotropis gigantean*	Rui	Shrub	June-Mar.
		Calotropis procera	Rui	Shrub	Dec.-Mar.
		Leptadenia reticulata	Bhuidodi	Climber	Apr.-Mar.
		Pergularia daemia	Utaranvel	Climber	Aug.-Jan.
28	Periplocaceae	*Cryptolepis buchananii*	Dudhi	Climber	Apr.-Nov.
		Hemidesmus indicus	Anantmul,Khobarvel	Climber	Aug.-Dec.
29	Convolvulaceae	*Ipomoea fistulosa*	Besharam	Shrub	Throughout
30	Bignoniaceae	*Millingtonia hortensis*	Akashneem	Tree	Oct.-Dec.
		Spathodea campanulata	African tulip	Tree	Dec.-Apr.
		Tecoma stans	Ghantiful	Shrub	Sep.-Feb.
31	Acanthaceae	*Adhatoda zeylanica*	Adulsa	Shrub	Aug.-Dec.
32	Verbenaceae	*Clerodendrum splendens*	FlamingGlorybower,P agoda flower	Climber	Sep.-Dec
		Duranta erecta	Skyflower	Shrub	Throughout
		Lantana camara	Ghaneri,Tantani	Shrub	Throughout
		Lantana montevidensis	Rainmuniya	Shrub	
		Tectona grandis	Sagwan	Tree	June-Dec.

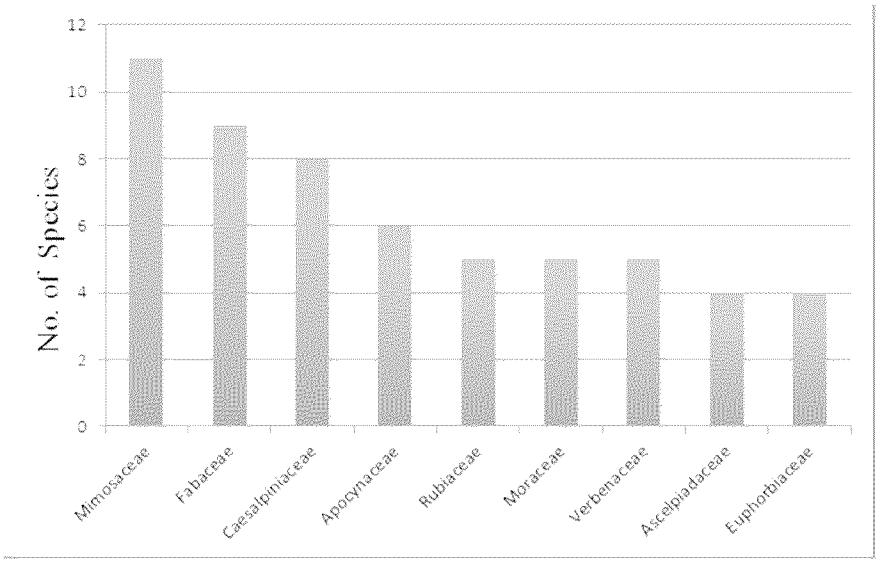

Fig.1: Plant Families with higher number of perennials in Study Area.

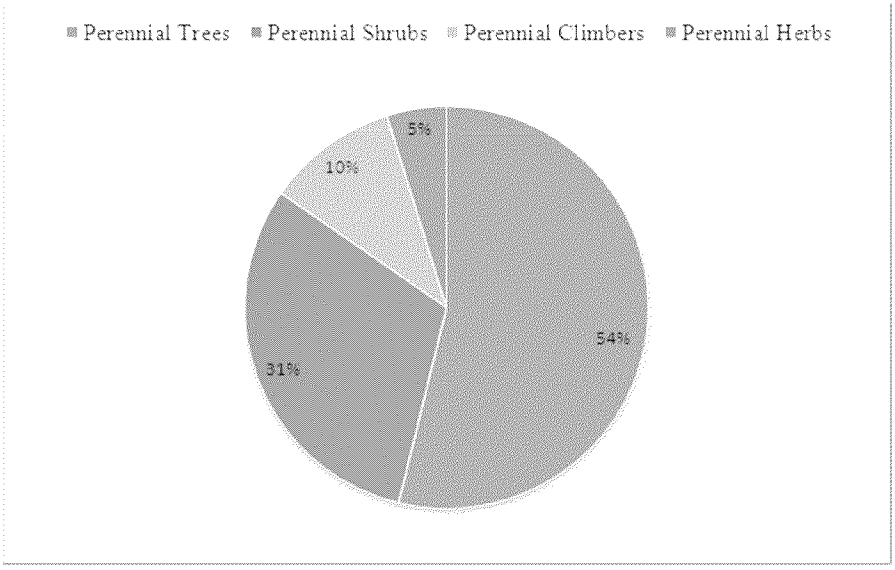

Fig 2:Percentage Composition of different Perennial plant habits in Study Area

Conclusion

The survey of Perennial angiosperms from LIT Campus, Nagpur helps in inventorization of diversity which contribute towards a conservation task. The biodiversity of campus is important as it is vital that native and endemic species of flora are conserved..The Present study reveal that the campus is rich in native as well as exotic flora but the diversity among the species are less due to some areas covered under monotypic plantation of *Dalbergia sissoo, Polyalthia*

longifolia and *Cassia siamea* and due to invasion of non native species. Although some undisturbed areas in campus has wild diversity of trees, shrubs and some climbers. Due to construction at various places some plants are under threat.

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17. Efficacy of Beauveria Bassiana Inoculation and Susequent Dusting of Plant Powder on Coccon and Post Coccon Characters of Pm and CSR 2 Race of Silkworm Bombyx Mori L

J. A. Chavan
U. S. Deshmukh
Department of Zoology, Government Vidarbha Institute of Science and Humanities, Amravati.

Abstract

In the present investigation *Beauveria bassiana* infection and subsequent dusting of plant powder effect was studied. After the inoculation and dusting of plant powder observed the cocoon and post cocoon characters in both PM mad CSR2 race of *Bombyx mori* L. *Beauveria bassiana* inoculated group showed decreased the cocoon characters in both races. The significantly increased cocoon characters were observed in both races due to application of plant powder having the antifungal activity. Maximum increased cocoon characters was observed in *Curcuma longa* treated group in both races when compared with other plant powder treated and control group.

Key words: *Beauveria bassiana, Bombyx mori, Curcuma longa, Argemone mexicana, Clerodendrum multiflorum*

Introduction

Fungal diseases of silkworm are called muscardine. White muscardine is caused by different species of *Beauveria*, of which the most virulent is *Beauvria bassiana*. The characteristic feature of the disease is mummification of infected larvae till and after death by deposition of calcium oxalate salts so this disease is also called 'Calcino' in Italy and 'Sannakaddi' or Sunnakattarga' in Karnataka. This disease develops rapidly in larvae. The infection takes place mainly through skin -10% infection alone occurs through the mouth or through the spiracles (Devaiah, 1994). White muscardine is the earliest known disease of silkworm caused by an entomopathogenic fungus *Beauveria bassiana* Bassi (1835) and more than 150 insect species are attacked by this fungus (Bell, 1974) due to this disease a total loss of

10 - 40% accounted to sericulture industry in Japan and Indian (Janakiraman, 1961, Ayuzawa *et al.,* 1972).

The most common route of infection is through the external integument, although infection through digestive tract is possible (Gabriel, 1959). Mainly the conidia attach to the cuticle, germinate and penetrate the cuticle (Boucias *et al.,* 1988; Lefebvre, 1934). The control of infectious diseases is a seriously threatened by the continuous increases in the number of microorganisms that are resistance to the chemical antimicrobial drugs (Nenaah and Ahmed, 2011). The chemical based disinfectants and drug formations used for prevention and control of this disease are not economic, eco-friendly and have many limitations to be effective in open and outdoor rearing.

Now days the efforts were made to promote the use of botanicals as possible alternatives to treat infectious diseases (Mohsenzadeh, 2007; Jazani *et al.,* 2009; Chanda, 2011). The natural products were found to possess promising antimicrobial activities when applied alone or in combination with conventional antimicrobial drug (Jazani, 2009). Kumar *et al.*, (2009) and Manimeghalai *et al.,* (2000) used plant products and succeeded to grasserie disease (caused by nuclear polyhedrosis virus) in mulberry silkworm, *Bombyx mori.*

Material and Methods

Material used for present work was silkworm larvae reared in laboratory according to the method of Krishnaswami *et al.,* 1978. The *B. bassiana* was cultured in petriplates using sabouraud's dextrose agar.

Cocoon weight

The 10 cocoon randomly selected for cocoon weight. The mean weight of cocoon was calculated and expressed in milligrams per shell.

Shell weight

Randomly selected 10 cocoons were cut open with the help of sharp blade and the shell weight was recorded accurately and expressed in milligrams per shell.

Shell ratio

Shell ratio denotes the total amount of silk available in a single cocoon and is expressed in percentage. It is the ratio between shell weight and cocoon weight, which were randomly selected. It is calculated by using following formula,

$$\text{Shell ratio} = \frac{\text{Weight of Shell}}{\text{Weight of cocoon}} \times 100$$

Floss weight

It is the weight of floss recorded randomly selected 10 cocoons and the value was expressed in milligram.

Filament length

It is the total length of the realable silk from a single cocoon. 10 randomly selected cocoons were coocked and reeled and the mean value of filament length in meters was calculated.

Filament weight

It is the weight of silk reeled from 10 randomly selected cocoons and used for the assessment of filament length and it is expressed in milligrams.

Denier

Denier represents the size of the silk filament, i.e., the weight in grams of 9000 meters of yarn per filament. It was calculated by using the formula,

$$\text{Denier} = \frac{\text{Weight of filament in grams}}{\text{Weight of the filament in meter}} \times 9000$$

Results and Discussion

Results are showed in **Table No. 1**

1. Cocoon weight

The CSR2 race showed the more cocoon weight of 1140.4mg than the PM race 899.30mg. The *B. bassiana* inoculated group showed the significant decreased in shell weight percentage in both PM by 35.10% and in CSR2 by 34.6%. The maximum decrease was observed due to inoculation in PM as compared to CSR2 race. The application of plant powder showed non significant reduction decrease in all groups when compared to the control. In *C. longa* treated groups the percent decrease was observed in PM by 5.04% while in CSR2 the percent increase was observed by 5.57%. The dusting of *A. Mexicana* powder showed the decreased cocoon weight in PM by 10.4% while in CSR2 by 6.69%.

The dusting *C. multiflorum* powder after inoculation of *B. bassiana* showed the decreased in shell weight 16.6% in PM and by 5.82% in CSR2.

The above results revealed that the cocoon weigh was decreased after the inoculation of *B. bassiana* in both races under study. The maximum percent decrease was observed in PM as compared to CSR2. In all plant powder treated groups more decrease was observed in PM race than in the CSR2 race. In case of *C. longa* treated group of CSR2 race the cocoon weight was slightly increased over the control.

2. Shell Weight

From the observation it became clear that *B. bassiana* inoculation responsible for reduction in shell weight in both races. The decreased percentage was more in CSR2. After the application of plant powder in both races the percent decrease was observed in all groups except *C. longa* treated group of CSR2. The percent decrease was less as compared to the inoculated groups in both races.

3. Shell ratio

The inoculation of fungus causes the reduction in shell weight in both races. The more shell weight reduction was observed in CSR2 race than PM race.

Due to dusting of plant powder the less reduction was observed in shell weight in PM race while in CSR2 the improvement in shell weight was noticed. In CSR2 race *C. longa* treated group showed the maximum shell weight when compared with control and other plant extracts treated groups. In PM percent decrease shell weight observed in all groups while in CSR2 the percent increase in shell weight observed in all groups of dusting plant powder having the antifungal activity.

4. Floss weight

In both race after the treatment with plant powder showed the minor reduction in floss weight as compared to fungus inoculated group. The plant powder treated groups showed more or less similar results compared with control.

5. Filament length

The observation indicates that, the inoculation of *B. bassiana* causes the reduction in filament length in both the PM and CSR2 races. But after the dusting of plant powders showed the reduced filament lengths than control groups. But it was more when compared to *B. bassiana* inoculated groups of both races.

6. Filament weight

The filament weight get reduced after inoculation of *B. bassiana.* The dustings of plant powder showed non significant changes in filament were when compared to control groups. The improvement in filament weight was observed in *C. longa* treated groups of CSR2 race, when compared with control group but in PM race improvement in filament weight was observed in *C. multiflorum* treated group.

7. Denier

From the results mentioned in table 1 it became clear that observation noticed that the inoculation of fungal spore responsible for reduction in denier in both races the more reduction was noticed in CSR2 as compared to PM race. After the inoculation of *B. bassiana* and subsequent the dusting of plant powders showed that the denier got increased when compared to inoculated group in both races. The plant powder dusting groups showed improved denier when compared to control in both races. The higher denier was observed CSR2 race in *C. longa* treated group and minimum in *C. multiflorum* treated group. In case of PM race the greater denier was observed in *C. multiflorum* group and lesser was observed in *A. mexicana* treated group when compared to control of both PM and CSR2 race. The present results as per the findings of Manohar Raj (1994) who reported the effectiveness of aqueous extracts of *P. corylifolia* against the BmNPV in *B. mori* L. The effectiveness of *Acacia suma* and *Caesalpinia coriaria* reducing the mortality due to the grasserie in third instar larva of *B. mori* (Manoharan, 1996). The reduction of grasserie disease was reported by using the *Curcuma longa* and chalk powder by Manimegalai *et al.,* (2000). The aggregation of polyhedral on treating with aqueous extracts of *T. terrestris* was reported by Sivaprakasam (1999). The aggregation may be due to the tannins and phenols present in plants. This is supported by Keating *et al.,* (1998), who reported that tannins and phenols may be able to bind directly with the virions and subsequently interfere with virus host cell interaction. The aqueous extracts of *A. suma* and *C. coriaria* showed the higher rate of aggregation and lesser mortality due to BmNPV. The higher aggregation of PIBs might be the reason for grasserie suppression when these were fed by worms reported by Manoharan (1996). The results obtained in the present study were similar with earlier reports on antifungal effect of *S. isoetifolium* revealed by Kumar *et al.,* (2009). From the above results it is concluded that by using plant powder reduced the mortality in silkworm due to muscardine infection and save the crop up to 70%.

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Table No.1: Effect of B. bassiana infection and subsequent dusting of plant powder on cocoon and post cocoon characters in PM and CSR2 B. mori L.

GROUPS	RACE	COCOON WEIGHT (mg)	SHELL WEIGHT (mg)	SHELL RATIO (%)	FLOSS WEGHT (mg)	FILAMENT LENGTH (m)	FILAMENT WEIGHT (mg)	DENIER (d)
CONTROL	PM	899.30 ± 82.17	94.40 ± 7.49	11.66 ± 1.59	13.10 ± 1.52	305.80 ± 38.58	84.00 ± 9.66	2.45 ± 0.42
	CSR2	1140.4 ± 167.9	216.3 ± 28.5	19.1 ± 2.0	7.7 ± 2.1	725.2 ± 216.0	188.3 ± 31.5	2.2 ± 0.3
OCULATED	PM	583.6 ± 150.3 (-35.10) ***	78.9 ± 13.3 (-16.41) **	9.4 ± 1.6 (-19.16) *	10.5 ± 2.0 (-19.8) NS	175.8 ± 51.1 (-42.51) ***	58.3 ± 16.9 (-30.95) ***	1.9 ± 0.5 (-21.63) NS
	CSR2	745.2 ± 145.1 (-34.6) ***	105.3 ± 49.6 (-51.3) ***	14.4 ± 4.1 (-24.4) **	5.6 ± 1.6 (-27.27) NS	159.9 ± 120.3 (-72.4) ***	149.2 ± 58.8 (-20.7) **	1.0 ± 0.4 (-56.07) ***
C. LONGA	PM	853.9 ± 114.7 (-5.04) NS	91.50 ± 7.59 (-3.07) NS	10.82 ± 1.21 (-7.1) NS	11.90 ± 5.45 (-9.16) NS	278.20 ± 47.25 (-9.02) NS	82.20 ± 13.99 (-2.14) NS	2.67 ± 0.24 (+8.97) NS
	CSR2	1204.0 ± 147.3 (+5.57) NS	267.2 ± 36.5 (+23.5) NS	20.36 ± 3.40 (+0.6) NS	9.50 ± 2.72 (+23.57) NS	901.40 ± 117.87 (+24.29) NS	203.80 ± 24.58 (+8.25) NS	3.01 ± 0.77 (+37.03) *
MEXICANA	PM	805.0 ± 159.9 (-10.4) NS	88.10 ± 11.56 (-6.6) NS	11.25 ± 2.11 (-3.5) NS	13.50 ± 3.81 (+3.05) NS	271.60 ± 47.26 (-11.1) NS	78.40 ± 9.47 (-6.6) NS	2.53 ± 0.51 (+3.14) NS
	CSR2	1064.3 ± 191.1 (-6.69) NS	193.2 ± 77.9 (-10.6) NS	19.51 ± 2.64 (+2.21) NS	8.30 ± 3.33 (+14.28) NS	598.7 ± 189.4 (-17.4) NS	172.1 ± 72.4 (-8.60) NS	2.53 ± 0.72 (+15.72) NS
ULTIFLORUM	PM	749.3 ± 69.8 (-16.6) NS	85.50 ± 9.55 (-9.4) NS	11.43 ± 1.16 (-1.9) NS	10.80 ± 3.16 (-17.5) NS	274.50 ± 36.94 (-10.2) NS	86.50 ± 9.32 (+2.97) NS	2.82 ± 0.41 (+15.22) NS
	CSR2	1074.0 ± 99.0 (-5.82) NS	211.0 ± 22.50 (-2.45) NS	19.75 ± 2.43 (+3.40) NS	9.10 ± 3.84 (+18.18) NS	603.2 ± 154.1 (-16.8) NS	157.2 ± 47.3 (-16.5) NS	2.35 ± 0.39 (+7.45) NS

Values with ± indicate mean with standard deviation, '+' and ' –' indicate percent increase and decrease *, **, * and NS indicates the significance level P < 0.05, P < 0.01, P < 0.001 and P < 0.05 respective.**

18. Taxonomic and Behaviour Study of Potter Wasp Xenorhynchium Nitidulum (Fabricius) (Hymenoptera, Eumeninae)

C. R. Deshmukh
Assistant professor, Department of Zoology, Taywade College, Koradi dist. Nagpur.

Xenorhynchium nitidulum (fabricius) is a Eumenine social potter wasp which is common in Orissa and other part of India (Vecht, 1963, P. Girish Kumar 2014). Xenorhynchium nitidulum (fabricius) also recorded from Koradi region Dist. Nagpur state.Maharashtra (C.R. Deshmukh 2017). In present work comprehensive survey was done for explore the behaviour of potter wasp. The characteristic of this potter wasp is nest which is made by moist mud is covered by sticky plant extract material which is easily recognized. This sticky coating protected nest from insect predators and parasitoids. Xenorhynchium nitidulum is some time "primitively social" wasp more than one adult female take part in building the nest.

Observation

Xenorhynchium nitidulum (Fabricius, 1798)

Diagnosis: female colour of body is black lower part of ocular sinus brown; wings deep fuscous with a purple reflection broadly along costal margin of forewing, the rest fusco-hyaline. Clypeus pyriform, bisinuate at apical half, apex broadly emarginated and angularly inside, sides on either side of apex oblique; labrum triangularly pointed at apex; tengula enlarged laterally, exceeding parategula posteriorly; postuscutellum strongly raised above the level of adjoining areas of propodeum, the flattened dorsal surface approximately rectangular and about as long as the vertically sloping posterior surface; propodeum with prominent lateral angles, the concave declivity rather sharply separated from dorsal and lateral areas. Male Antennal hook long and curved, somewhat dilated and flattened in apical half, with rounded apex, in curved position it almost reaches the apex of ninth antennal segment; S7 rather strongly excavated, the concave area finely, granulately punctuate and bordered by an arcuate and blunt ridge; parameral spine elongate. Colour is same as female except base of clypeus and ventral side of scape whitish-yellow, all flagellar segments brown ventrally, lower part of ocular sinus brown. Size: Female14-15mm, Male 14-15mm.

Nest : Xenorhynchium nitidulum usually build their nest at ceiling, window frame, fan, door frame or man -made structure by using moist mud. After site selection wasp start to build nest. The nest having several barrel shape cluster of cell the number of cell varies from 2 to 14 the large number of cell recorded 25 (Dutt,1912). The first three or four cells are attached to surface of the substratum by horizontal manner and remaining cells are arrange parallel to them and are hanging free of the substratum. The sizes of the cells are 17.0-22.0 mm in long and 12.0 mm in wide at the canter, the entrances of the cell are same direction at upward side. Female completed a single cell in a day. The outer side of the nest were coated with gummy substance this sticky material collected from the trees *Ficus religiosa* and *Acacia catechu* (Horne 1870, Dutt 1912). The cell without sticky plant extract coating look muddy colour nest while nest with sticky plant extract coating is glossy brown in colour. This sticky coating protected nest from insect predators and parasitoids. But some wasp like *Chalybion bengalense* and chrysidid wasp damage to the nest. *Chalybion bengalense* wasp open the entrance of the cell and lay egg inside it after laying the egg the *Chalybion bengalense* wasp sill the entrance of the nest by whitish mud particles. The chrysidid wasp (cuckoo wasp) probably opens an oviposition hole in the cell wall after the host cells are sealed (Bequaert, 1918: Iwata, 1976). Xenorhynchium nitidulum is some time "primitively social" wasp more than one adult femaleassociate in building the nest. The one wasp collect the moist mud while another wasp protecting the nest from intruder by singing.

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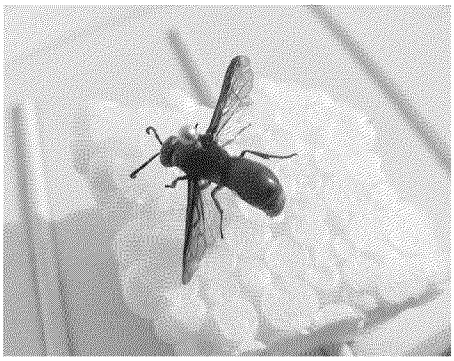
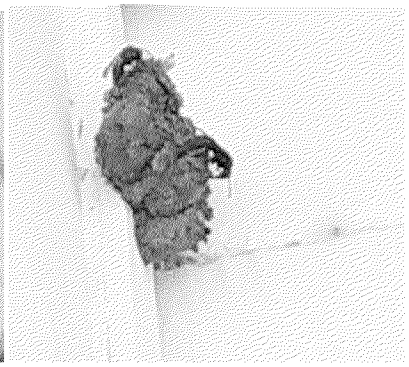
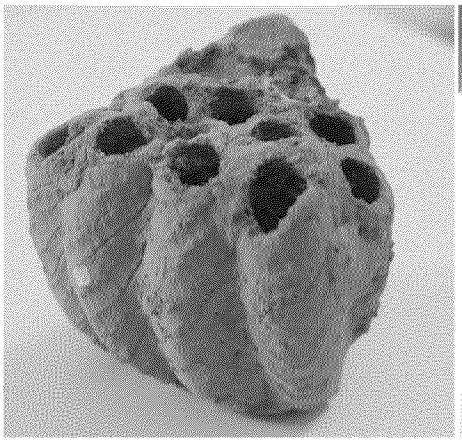


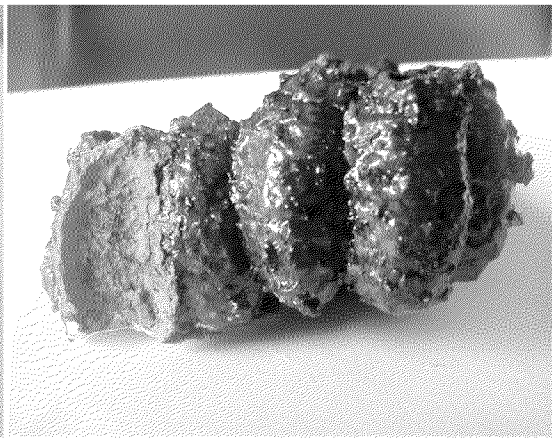
Xenorhynchium nitidulum (Fabricius)



more than one adult female associate in building the nest



Wasp nest without sticky plant extract coating



Wasp nest with sticky plant extract coating

19. Antioxidant, Hemolytic Activities and Phytochemical Content of Symplocos Racemosa Roxb

Vivek N Dhabadge
Prof. R M Mulani
School of life sciences, SRTM University, Nanded.

Abstract

In present study plant *Symplocos racemosa Roxb* was screened for the antioxidant and helolytic activity with finding correlation with their phenol and flavonoids content *Symplocos racemosa Roxb* methanol extract contain a large amount of polyphenol content Methanol fraction (51.05mg/gm), *Symplocos racemosa Roxb* methanol fraction contain more(56.98 mg/gm) amount of flavonoids, chloroform fraction of *Symplocos racemosa Roxb* (74.61 %), was found to be more DPPH radical scavenger, *Symplocos racemosa Roxb Methanol* fraction (57.17 %) found to be maximum potential to scavenge hydroxyl radicals, *Symplocos racemosa Roxb* methanol fraction (87.46 %) was found to effective reducing agent, The ferrous ion chelating activity was noted higher in *Symplocos racemosa Roxb* methanol fraction (47.97 %). The best nitric oxide radical scavenger among the tested plant sample was observed in *Symplocos racemosa Roxb* hexane fraction (20.88 %), Hemolytic activity demonstrated by using RBC, methanol fraction of *Symplocos racemosa Roxb showing highest* hemolytic activities (4.15 %).

Key words: - Antioxidant, Hemolytic, Phenolic, Flavonoids and *Symplocos racemosa Roxb.*

Introduction

The use of medicinal plants, plant extracts or plant-derived pure chemicals to treat human ailments is an important alternative therapeutic approach. There is renewed interest in medicinal plant research, which possess good source of new bioactive drugs and now contributing 90% of newly discovered pharmaceuticals (1,2). For the management of various ailments medicinal plants play an important role [3-8]. Strong antioxidants are present in plants because plants are richly supplied with vitamins, flavonoids coumarins, phenolics, terpenoids, tanins and alkaloids, etc. [3,4]. So, medicinal plants contain many key compounds that can be used for the management of oxidative stress induced diseases [5,6]. A number of investigational and

epidemiological studies for the positive outcome by intake of antioxidant moieties of plant origin have been published [7,8]. Symplocos racemosa (Symplocaceae) commonly known as "Lodhra" in Sanskrit or "Rodhra". It is a small evergreen tree up to 6 m tall. It is found in the plains and lower hills through out North and East India [9]. The bark is dark grey and rough and is useful in diarrhea, dysentery, eye diseases, fever, ulcer, scorpion sting, diabetes and liver disorders [10].It has been scientifically reported as an antimicrobial [11], anticancer [12] and has beneficial effects in gynaecological disorders [13,]

The objective of the present study was to evaluate the of antioxidant potential long with Hemolytic activitie and phytochemical content of *Symplocos racemosa Roxb*.

Materials and Methods

Chemical and reagent

Folin ciocaltau reagent, DPPH (2, 2, diphenyl-1-picrylhydrazyl), were purchased from Himedia Laboratories Pvt.Ltd., Mumbai, Ascorbic acid, DMSO, EDTA Triton X-100, Fecl3,1-10- Phenanthroline, α-Tocopherol, Sodium nitroprusside, Napthylendiamine dichloride, Nitric oxide, Rutin hydrate, Ferrozine, Potassium hexacyanoferrate, Trichloroacetic acid, Ferric chloride, Folin-Ciocalteu, Methanol, Chloroform, Hexane and all other solvent, chemical and reagent used for different bioassay were purchased from commercial sources.

Plant material

The plant material were porches from Yogesh Pharmacy Nanded.

Sequential extraction of plant samples and measurement of yields

Plant sample(10gm) were sequentially extracted in Methanol, Chloroform, and Hexane up to 8 hours using Soxhelet's apparatus. The extracted samples were evaporated by using Rota evaporator.

Estimation of phenolic content

The estimation of polyphenolic content from selected plant extracts was determined by earlier reported method (14). The phenolic compound undergoes reaction with an oxidizing agent phosphomolybdate present in the Folin–Ciocalteau reagent, the resultant reaction product is a blue colored complex having maximum extinction at 660 nm. In brief, the reaction cocktail contained 1 ml extract of individual plant sample, 2 ml distilled water, 0.5 ml Folin–Ciocalteau reagent and 2 ml of Na2CO3 (20%). The mixture was kept in boiling water bath for 1 min and after cooling, the absorbance was measured at 660 nm against appropriate blank using UV–VIS

spectrophotometer. The amount of total polyphenols was calculated by preparing a calibration curve using different dilutions of rutin (500 lg/ml) and the unknown amount of phenolics were estimated as mg/g of samples.

Total flavonoids content

Total flavonoids content of individual plant sample was estimated by aluminium chloride method described elsewhere (15). The reaction mixture contained 1 ml of plant sample, 3 ml methanol, 0.2 ml of 10% aluminum chloride, 0.2 ml (1 M) potassium acetate and 5.6 ml of distilled water. The mixture was incubated up to 30 min at room temperature and absorbance was recorded at 415 nm using UV–VIS spectrophotometer. The standard curve was prepared using serial dilutions of quercetin (100 lg/ml). The concentration of flavonoids of individual plant sample was calculated using the standard curve and the amounts were expressed in quercetin equivalent (mg/g).

DPPH radical scavenging assay

DPPH radical scavenging assay was performed as per the earlier reported method (16). The reaction mixture contained different concentrations of the individual plant extracts with equal volume of DPPH radical (10^{-4} M in absolute ethanol) solution. After 20 min reaction time, the absorbance was recorded at 517 nm using UV–VIS spectrophotometer. The optical density of control was considered as 100% unreduced DPPH Ascorbic acid was used as a standard antioxidant agent.

Hydroxyl radical scavenging activity

Hydroxyl radical scavenging activity was determined by the earlier reported method (17). The reaction cocktail contained 60 ll of 1 mM, Fecl3, 90 ll of 1 mM 1,10-phenanthroline, 2.4 ml of 0.2 M phosphate buffer (pH 7.8), 150 ll of 0.17 M H2O2, and 1.5 ml of various concentration of individual plant extract. Reaction mixture kept at room temperature for 5 min incubation and absorbance was measured at 560 nm using spectrophotometer. α-Tocopherol was used a reference compound.

Nitric oxide radical scavenging activity

Nitric oxide radical scavenging activity was measured according to the previously described method (18). The reaction mixture contained 2 ml of 10 mM sodium nitroprusside, 0.5 ml of phosphate buffer saline (pH 7.4) and 0.5 ml of plant extract was incubated at 25 ————————————C for 150 min. After incubation time 0.5 ml of reaction mixture

was mixed with 1 ml of sulfanilic acid reagent (33% in 20% glacial acetic acid) and incubated up to 5 min. Finally 1 ml of napthylenediamine dihydrochloride (0.1% w/v) was added and incubated at room temperature for 30 min. The absorbance was measured at 560 nm using UV–VIS spectrophotometer. Rutin hydrate was used a reference compound.

Hydrogen peroxide scavenging activity

The ability of plant extracts to scavenge hydrogen peroxide was determined according to the earlier described method (19). A solution of hydrogen peroxide (40 mM) was prepared in phosphate buffer (pH 7.4). Hydrogen peroxide concentration was determined by measuring absorbance at 230 nm using spectrophotometer. The extracts prepared in distilled water were mixed with 0.6 ml of hydrogen peroxide solution (40 mM). The absorbance of hydrogen peroxide at 230 nm was determined after 10 min against a blank solution contained plant extracts in phosphate buffer without hydrogen peroxide. The absorbance of hydrogen peroxide (40 mM) without plant extract was considered as control. α-Tocopherol was used a reference compound for comparative study.

Ferrous ion chelating ability

The ferrous ion chelating activity of the selected samples was measured by using method of (20). The reaction mixture contained 3 ml of individual plant extract, 0.3 ml of 2 mM FeCl2, 0.6 ml of 5 mM Ferrozine solution and the mixture kept for 10 min incubation at room temperature and absorbance was measured at 562 nm. Na2EDTA was used as a reference compound.

Result

Estimation of total phenols and total flavonoids from selected plants

Flavonoids and polyphenol compound are repated for their health promoting properties due to their high antioxidant capacity. Flavonoids have been described to be excellent free radical scavenging agents. *Symplocos racemosa Roxb* methanol extract contain (51.05 mg/gm) a large amount of polyphenol content Methanol 51.05mg/gm Chloroform 38.59 Hexane 17.05 as compare to all tested sample The amount of flavonoids was estimated in quercetin equivalent. *Symplocos racemosa Roxb* methanol fraction contain more(56.98 mg/gm) amount of flavonoids very lowest amount of flavonoids contents in hexane fraction (31.87 mg/gm)

Sr No	Name of plant()	Solvant	Total poly phenol mg/gm of	Total flavonoids mg/gm of

			sample	sample
1	*Symplocos racemosa Roxb*	Methanol	51.05	56.98
		Chloroform	38.59	48.36
		Hexane	17.05	31.87

DPPH radical scavenging activity of selected plant samples

All selected plant extracts have shown considerable DPPH radical scavenging activity. Among the tested plant sample chloroform fraction of *Symplocos racemosa Roxb* (74.61 %), was found to be more DPPH radical scavenger while minimum effect was found in case of Hexane fraction. Ascorbic acid (86.34 %) was used as reference compound.

Sr No	Name of plant(Total flavonoids content)	Solvant	DPPH inhibition (%) of plant sample in different solvent
1	*Symplocos racemosa Roxb*	Methanol	2.95
		Chloroform	74.61
		Hexane	43.34
2	Ascorbic acid		86.34

Hydroxyl radical scavenging activity

The selected plant extract were screened for hydroxyl radical scavenging activity (Table.7) from all tested sample the *Symplocos racemosa Roxb* Methanol fraction (57.17 %) found to be maximum potential to scavenge hydroxyl radicals. The lowest OH radical scavenging potential found in *Symplocos racemosa Roxb* chloform fraction.(34.40 %). α-tocopherol (82.67 %) was used as reference compound.

Sr No	Name of plant(Total flavonoids content)	Solvant	OH radical scavenging potential (%) of plant sample in different solvent
1	*Symplocos racemosa Roxb*	Methanol	57.17
		Chloroform	34.40
		Hexane	53.98
2	α- Tocopherol (Vitamin E)		82.67

Fe 3+reducing power assay

Among the all tested plant sample *Symplocos racemosa Roxb* methanol fraction (87.46 %) was found to effective reducing agent. The minimum reducing capacity was observed in fraction of chloroform fraction (50.64%).Ascorbic acid was used as reference compound. (89.31 %)

Sr No	Name of plant(Total flavonoids content)	Solvant	Fe^{3+} Reducing power potential (%) of plant sample in different solvent
1	*Symplocos racemosa Roxb*	Methanol	87.46
		Chloroform	50.64
		Hexane	54.98
2	Ascorbic acid		89.31

Ferrous ion chelating ability

The ferrous ion chelating activity was noted higher in *Symplocos racemosa Roxb* methanol fraction (47.97 %) and lowest in *Symplocos racemosa Roxb* chloroform fraction. EDTA (92.10 %) was used as a standard chelating agent.

Sr No	Name of plant(Total flavonoids content)	Solvant	Ferrous ion chelating ability (%) of plant sample in different solvent
1	*Symplocos racemosa Roxb*	Methanol	47.97
		Chloroform	28.75
		Hexane	40.85
2	Na2 EDTA		92.10

Nitric oxide radical scavenging activity

The best nitric oxide radical scavenger (table no.11) among the tested plant sample was observed in *Symplocos racemosa Roxb* hexane fraction (20.88 %) and lowest in chloroform fraction (15.7 %) showed. Rutin was used as standard compound (98.76 %).

Sr No	Name of plant(Total flavonoids content)	Solvant	Nitric oxide radical scavenging (%) of plant sample in different solvent

1	*Symplocos racemosa Roxb*	Methanol	19.88
		Chloroform	15.7
		Hexane	20.88
2	Rutin hydrate		98.76

Toxicity studies of selected plant samples using hemolysis assay

Selected medicinal plant extract in different solvents were evaluated for their cytotoxicity effects on human blood cells. The result of cytotoxicity of crude extract of these plant are summarized in table no.10 At 1µg/ml concentration, most of the plant sample were found to nontoxic except the negligible cytotoxicity demonstrated by methanol fraction of *Symplocos racemosa* (4.15 %). Triton X-100 used as a positive control.

Sr No	Name of plant(Total flavonoids content)	Solvant	Hemolysis (%) of plant sample in different solven
1	*Symplocos racemosa Roxb*	Methanol	4.15
		Chloroform	7.64
		Hexane	9.36
2	Titran X100		45.65

Summery and Conclusion

The result of present investigation indicates that the selected plants can be considered as antioxidant agent, which may be useful for the management of oxidative stress and related complication. Therefore, present study successfully conclude with the chloroform fraction of *Symplocos racemosa Roxb* have a potent antioxidant activity this plant can be useful preparation herbal product. The findings of the present study may contribute for standardization of presently use herbal medicine containing ingredient of selected plant sample. Nevertheless, the selected plants can be further explored for isolation and identification of novel antioxidant agent.

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20. The Effect of Early Blight Disease on Biochemical Changes in Tomato Varieties

Dr. Ghuge D. S.
N. W. College, A. Balapur Ta. Kalamnuri.

Abstract

Biochemical changes are observed in tomato leaves and fruits healthy as well as infection caused by *Alternaria solani*. There was a significant variation between healthy and infected leaves and fruits which showed significant changes with respect to estimation of lycopene, protein, phenol, ascorbic acid, total sugar and chlorophyll. Lycopene content in US-2175 variety was decreased due to *Alternaria solani* while, protein content in US-618, US-2175; ascorbic acid content in SBGI-555, Swadeshi and Veer variety, phenol content in SBGI-555 variety; total sugar content in Veer variety and Chlorophyll content in leaf of Bioseed-56 variety was drastically hampered due to *Alternaria solani* .

Introduction

Tomato (*Lycopersicon esculentum* Mill) belongs to the family solanaceae and is one of the most remunerable and widely grown vegetables in the world. Tomato is grown for its edible fruits, which can be consumed either fresh or in processed form and is a very good source of vitamins A, B, C and minerals. Tomato cultivation has become more popular since mid nineteenth century because of its varied climatic adaptability and high nutritive value. Tomato is being exported in the form of whole fruits, paste and in canned form to West Asian countries, U.K., Canada and USA. There are several diseases on tomato caused by fungi, bacteria, viruses, nematodes and abiotic factors (Balanchard, 1992). Among the fungal diseases, early blight also known as target spot disease incited by *Alternaria solani* (Ellis and Martin) Jones and Grout is one of the world's most catastrophic disease. The causal organism is air borne and soil inhabiting and is responsible for early blight, collar rot and fruit rot of tomato (Datar and Mayee, 1981). The disease appears on leaves, stems, petiole, twig and fruits under favourable conditions resulting in defoliation, drying off of twigs and premature fruit drop and thus causing loss from 50 to 86 percent in fruit yield (Mathur and Shekhawat, 1986). Pathogen also causes leaf and fruit rot in pre harvest and post harvest stages. Leaf rot causes decrease in the photosynthesis rate

which ultimately causes the less synthesis of food and affect on the yield. Infected fruits are disqualified in the market. Considering this fact present investigation has been undertaken to understand biochemical changes in tomato leaves and fruit due to early blight disease.

Materials and Methods

Changes in lycopene content

Extraction method was performed according to Fish *et al.*, (2002). Samples were first chopped and homogenized in a laboratory homogenizer. Approximately 0.3 to 0.6 g samples were weighed and 5 mL of 0.05% (w/v) BHT in acetone, 5 mL of ethanol and 10 mL of hexane were added. The recipient was introduced in ice and stirred on a magnetic stirring plate for 15 min. After shaking, 3 mL of deionized water were added to each vial and the samples were shaken for 5 min on ice. Samples were then left at room temperature for 5 min to allow the separation of both phases. The absorbance of the hexane layer (upper layer) was measured in a 1-cm-path-length quartz cuvette at 503 nm blanked with hexane.

Changes in protein content

Changes in protein content were estimated by using Lowry's method (1951).

(Reagents: A. 2% Na_2CO_3 in 0.1 N NaOH; B. 1% sodium pottasium tartrate in H_2O; C. 0.5% $CuSO_4.5\ H_2O$ in H_2O; D. 48 ml of A, 1 ml of B, 1 ml C; E. Phenol Reagent - 1 part Folin-Phenol [2N] : 1 part water; BSA Standard – 50mg BSA in 50ml D.W.).

0.2, 0.4, 0.6, 0.8 and 1 ml of working standard BSA was pipetted out in a series of test tubes. 0.1 ml of sample extract was pipetted out in another test tube. In all test tubes volume of 1 ml was made and tube with 1 ml of water served as a control. Then 5 ml of reagent C was added in all the test tubes including blank. It was then mixed well and incubated for 10 minutes at room temperature. 0.5 ml of dilute Folin-phenol solution was added to each tube. Each tube was vortexed immediately and incubated at room temperature for 30 minutes. Blue colour was appeared and at 660 nm O.D. were taken. Absorbance *vs* mg protein graph was plotted to obtain standard curve.

Changes in total sugar content

The sugar content in the leaf powder was estimated by the procedure recommended by Oser (1979) as follows.

500mg of leaf powder was taken in 50ml distilled water and boiled, then filtered. Further filtrate was diluted up to 100ml. Three Folin-wu tubes were taken and to it following content were added

(1) Blank tube - Distilled Water 2ml (2) 2ml glucose 'C' solution. (3) 2ml filtrate. In each tube 3ml alkaline solution of copper was added. Then tube was boiled in boiling water bath for 8 minutes. The tubes were cooled under tap water and 2ml of phosphomolybdic acid solution was added which gave blue colour. Then this solution was diluted up to 25ml distilled water and optical density was determined at 420nm and the amount of reducing sugar present in leaf powder was calculated.

Percent total sugar was calculated by following formula

$$\text{Mg sugars/100mg samples} = \frac{\text{O.D. of unknown} \times 100 \times 0.4}{\text{Conc. from graph} \times 2 \times W}$$

Where, V = volume of the filtrate

W = weight of the sample taken

Changes in ascorbic acid

Vitamin C content was estimated by standard titration method. 5 ml of standard solution of standard ascorbic acid (100mg /ml) was pipette out into a conical flask, then 10ml of 0.4 % oxalic acid was taken and it was titrated with dye solution. After that 2gm sample was extracted in 0.4% oxalic acid and volume was made up to 100ml by 0.4% oxalic acid. From that solution 5ml of sample was pipette out into conical flask and titrated with dye solution. End point was pink colour. Finally amount of vitamin C in mg / 100ml pulp was estimated by using following formula.

$$\frac{\text{Amount of ascorbic acid mg}}{\text{100ml pulp}} = \frac{0.5\text{mg}/V_1 \text{ ml} \times V_2\text{ml}/5\text{ml} \times 100\text{ml/wt. of sample} \times 100}{}$$

Where, V1 ml = volume of standard ascorbic acid.

V2ml = volume of sample's ascorbic acid.

Changes in phenol content

The total phenolic content of leaves was determined according to the method described by Malik and Singh (1980).

Aliquots of the extracts were taken in a 10 ml glass tube and made up to a volume of 3 ml with distilled water. Then 0.5 ml folin ciocalteau reagent (1:1 with water) and 2 ml Na_2CO_3 (20%) were added sequentially in each tube. A blue color was developed in each tube because the phenols undergo a complex redox reaction with phosphomolibdic acid in folin ciocalteau reagent in alkaline medium which resulted in a blue colored complex, molybdenum blue. The test solutions were warmed for 1 minute, cooled and absorbance was measured at 650 nm against the reagent used as a blank. A standard calibration plot was generated at 650 nm using known concentrations of catechol. The concentrations of phenols in the test samples were calculated from the calibration plot and expressed as mg catechol equivalent of phenol/g of sample.

Leaf chlorophyll assay

Healthy and infected tomato leaves were washed with sterile distilled water and Later on O.D. (Chl- a at 645nm and Chl-b at 663nm) of each sample was taken and chlorophyll content was estimated.

Experimental Results

Biochemical changes in different tomato varieties were calculated by using standard methods and results are given in table 1(a) and 1(b).

Lycopene content in tomato fruit were calculated. *Alternaria solani* was responsible in drastic decrease in lycopene content in US-2175 variety which is followed by Veer and SBGI-555 varieties of tomato. Protein content in infected tomato leaves were estimated by Lowery's method and results are given in table 1(a) and (1). Maximum decrease in protein content due to *Alternaria solani* was observed in US-618, US-2175, Atal and Mahaveer. Ascorbic acid content in SBGI-555, Swadeshi, Veer and US-618 tomato varieties was found to be hampered due to *Alternaria solani.* Phenol content in SBGI-555 variety leaf was drastically hampered due to *Alternaria solani* which is followed by US-618, US-2175, Bioseed-56 and Atal tomato varieities. Veer tomato variety showed maximum decrease in total sugar content in leaf due to *Alternaria solani* which is flowed by Bioseed-56, Karan, Mahaveer, SBGI-555, US-618 whereas maximum decrease in Chlorophyll content in leaf of Bioseed-56 variety was observed due to *Alternaria solani* which is followed by Veer, Mahaveer, Swadeshi and US-1196.

Conclusion

Spoilage means any change in the condition of food in which the food becomes less durable, or even toxic; these changes may be accompanied by alterations in taste, smell, appearance or texture (Akinmusire, 2011). F rom results it is clear that lycopene content in tomato fruit, protein content, vitamin C content, total sugar content, phenol content and chlorophyll content in tomato leaves were found to be decrease due to *Alternaria solani*. Similar results were reported by Ogaraku *et al.,* (2010). They found that, *Aspergillus niger, Aspergillus flavus, Alternaria alternata, Alternaria solani and Fusarium oxysporium* hampered the vitamin C contents in tomato fruit. Aulakh and Grover (1970) reported that *Phoma destructiva* depleted the vitamin C and carbohydrate contents in tomato fruit. Loss in amount of glucose in fruits have been reported for tomato-*Drechslera australiense* (Kapoor and Tandon, 1970); tomato-*Alternaria solani* (Mehta *et al.*, 1975); banana- *Gloeosporium musarum* (Wang, 1960). On the other hand, Tandon (1970), Pandey *et al.*, (1974), Fush *et al.*, (1980), Reddy and Laxminarayana, (1984) and Gadgile (2011) found that there is decrease in total sugar of mango fruit due to infection of *A. niger*. Vitamin C content of mango fruit was depleted by *Phomopsis mangiferae* and *Phoma exigua* (Reddy and Laximinarayan, 1984). Similarly, Arya (1993) reported the mango fruit infected with *Botryodiplodia theobromae* showed decrease in vitamin C content. In conclusion, the loss of vitamin C during pathogenesis may be due to production of suitable ascorbic acid degrading enzymes either by the fungus or by host pathogen interaction.

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Table 1(a): Biochemical changes in different varieties of tomato infected with *A. solani*

Parameters	Varieties									
	Bioseed-56		Atal		Mahaveer		Karan		Veer	
	Healthy	Diseased	Healthy	Diseased	Healthy	Diseased	Healthy	Diseased	Healthy	Diseased
Lycopene	4450.3 µg/ml	3702.4 µg/ml	4250.2 µg/ml	3527.5 µg/ml	4920.1 µg/ml	3805.5 µg/ml	4305.2 µg/ml	3909.2 µg/ml	4920.2 µg/ml	2750.2 µg/ml
Protien	65%	46%	70%	30%	67%	35%	71%	40%	69%	50%
Ascorbic acid	4750.2 µg/ml	2370 µg/ml	4450.5 µg/ml	2470 µg/ml	4570.5 µg/ml	2270 µg/ml	4650.5 µg/ml	2350 µg/ml	4020.2 µg/ml	2025.2 µg/ml
Phenols	34%	23%	35%	24%	37%	32%	38%	30%	36%	28%
Total sugar	50.0%	30.0%	52.2%	27.1%	49.5%	24.2%	48.4%	23.0%	46.9%	21.8%
Chloro-phyll	2.5	1	2.3	1.1	2.7	1.2	3.1	1.6	2.4	1.1

Table 1(b): Biochemical changes in different varieties of tomato infected with *A. solani*

Parameters	SBGI-555		Swadeshi		US-618		US-1196		US-2175	
	Healthy	Diseased	Healthy	Diseased	Healthy	Diseased	Healthy	Diseased	Healthy	Diseased
Lycopene	4845.3 µg/ml	3334.2 µg/ml	4435.8 µg/ml	3730.8 µg/ml	4725.1 µg/ml	3600.5 µg/ml	4405.2 µg/ml	4009.2 µg/ml	4720.2 µg/ml	2800.2 µg/ml
Protien	50%	35%	33%	15%	60%	10%	70%	50%	60%	10%
Ascorbic acid	4020.2 µg/ml	1525.2 µg/ml	4520 µg/ml	1722 µg/ml	4522 µg/ml	1822 µg/ml	4270 µg/ml	2370 µg/ml	5025 µg/ml	2402 µg/ml
Phenols	23.2%	16.5%	20.2%	15.2%	21%	14.2%	24.2%	15.2%	23%	16%
Total sugar	52.2%	28.2%	50.2%	30.2%	48.2%	22%	50.2%	20.2%	45%	20%
Chlorophyll	1.9	1	2.1	1.2	2.2	1.3	2.4	1.2	1.8	0.9

21. Ethno-Medicinal Plants Used in Treatment of Diarrhea and Dysentery from Manora Tribal Area

M. N. Iqbal
Head Department of Botany, M.S.P Arts, Science & K.P.T Commerce College Manora.

Abstract

Medicinal plants constitute a very huge and important natural resource used by indigenous medicinal system for the last 300 years. The past decade has seen a rapid progress in natural remedies. The tribal were observed having eczema, itching, skin eruption and boils, they apply natural drugs prepared by local medicine man. This study was aimed at identifying some medicinal plants used in treating diarrhea and Dysentery.

Introduction

WHO reported that every person of the population is infected and has disease? Most of the scientist have viewed about skin degasses that it is due to fungal and environmental changes. Medical sciences discovered remedies on skin diseases but it is effective in some extent. Mostly tribal peoples who live near to the forest and their life totally depend on plant product they never take any medicine, against diseases they used plants parts to cure the various diseases.

Ayurveda, the science of life, is a comprehensive system of natural health care that originated in India more than 5000 years ago. It is still widely used in India as a system of primary health care. Ayurvedic medicine has gained considerable momentum worldwide during the past decade. The important factor, which can contribute to the consistent quality of Products, is to have adequate standardization researches. Because of the natural heterogeneity, the quality of herbs obtained from wild collections shows great productive effect.

Semecarpus anacardium Linn. (Anacardiaceae) is distributed in sub-himalayan tract from the Sutlej eastwards, ascending to 3500 feet Scattered throughout the hotter parts of India. In Sanskrit and 'Bhilwa' in hindi has high priority and applicability in indigenous system of medicine and is being indicated for many ailments. ***Aloe vera* L.I, *Semecarpus anacardium* L.F, *Terminalia arjuna* (Roxb) W. & A, *Vitex nigundo* L., and *Argemone mexicana* L. are the some selected plants from different families for finding the result on skin disorder.**

Hence, considerable progress has been made in the development of highly effective, acceptable methods to cure the skin disease among the tribal peoples; the development of new skin disorder protective drugs from medicinal plants is an attractive preposition. Today's drugs have somewhat, to offer for alleviation of dermal ailments, whereas most important representatives of phytoconstituents used for skin diseases chiefly on regional basis. In this way Ayurvedic or ethnological drugs can be found useful. The indigenous information and the ancient literature about the plants and herbs can be effective to solve the diarrhea and dysentery problems.

Tribal like *Banjara* of the Manora area have been using various plants and their parts as medicine to check the dysentery and diarrhoea. Unfortunately, the ethno-medicinal estimation of dysentery and diarrhoea activity of medicinal plants was not recorded for this region. Hence, the present study is effort to gain insight in the knowledge of traditional medicine of this region.

Material and Methods

The survey was conducted in the tribal villages of Manora Tahsil. According to the plan field visits were given to the remote areas. During the visits Ayurvedic vaidu were conducted an interviewed and ethno-medicinal data was recorded as local names, scientific name, locality, plant parts used and mode of administration have been documented. Plants which has been collected during field visit identified with the help of flora (Naik, 1998) and photo album deposited in the Botany department of MSP Science college Manora.

Observation

1. ***Asparagus racemosus* wild (Safed musli)**

   Family: Asparagaceae

   Part used: Roots

   Tribals prescribed decoction of tuberous roots in dysentery and diarrhoea.

   Roots are antidysenteric and antidiarrhoea (Chopra et al 1956).

2. ***Cassia fistula* L. (Amaltas)**

   Family: Fabaceae

   Part used: Pod pulp

   Pod pulp is administered to cure dysentery.

3. ***Andrographis paniculata* (Burm.F) Wall (Bhuinimba)**

   Parts used: whole plant

Decoction of entire plant is used in the treatment of dysentery.

Srivastava, (1989) noted its used in dysentery.

4. ***Grewia hirsute*** **Vahl. (Salbardi)**

   Family: Tiliaceae

   Parts used: Roots, fruits.

   Root decoction and fruit pulp is used in the treatment of dysentery and diarrhoea.

   Fruits used in the treatment of dysentery and diarrhoea (Ramchandran et. Al 1986.)

5. ***Semecarpus anacardium*** **L (Bhilava)**

   Family: Anacardiaceae

   Parts used : Juice(Bark)

   Juice obtained from stem bark is used against dysentery.

Result and discussion

In the present study it has been observed that most of the plants are very common except few species which are vulnerable in this area. And the root, stem and fruit pulp is the commonest part used against dysentery and diarrhoea by local medicinemens (viduo). The total 20 plant species were reported from the tribal practioner's and authenticated through survey. In this paper only 05 plants represented and all these plants are needs to be prevent and conserved even chemically analyses. It will be helpful to extract the drugs.

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22. A Comparative Study on the Effect of Natural and Synthetic Cleansing Agents by Using Different Laundering Methods on Silk Fabric

Dr. Vandana B. Wankhede
Associate professor and Head, Smt V.N.Mahila Mahavidyalay, Pusad.

Clothing is the most important need of mankind. The main purpose of clothing is protection against climate. Modesty is the second purpose of clothing. In olden days men used different types of materials for covering their body. Slowly they started weaving by using grass and long leaves. After that they invented natural textile fibres. Such as wool, line, cotton, silk. Among textile fibres silk holds an unique place not only in India but all over the world.

Cultivated silk is second among the animal fibres and may still be regarded as the aristocrate of textile materials.

Silk has shiny, ilustrous, soft texture, attractive appearance and ready availability. It is an animal fibre obtained from silkworm. It has a delicate structure so strong alkali, heat friction are harmful to it. Since it is an animal fibre with nitrogenous content, the alkali, heat hardens the texture and weakens and sometimes damages the fabric. So silk fabric should be cleaned carefully.

Silk fabric is used all over the world not only for ceremonious occasions and festivals but also for daily wear. Because of the delicate structure silk need special care in washing. Surface of the fabric may be destroyed if not washed carefully. Too much friction weakens the fibre and remove its natural luster.

Water cannot alone accomplish the cleaning peocess. It needs cleaning agent like soap to enhance its washing ability. Cleansing may be defined as removal of dirt from surface by means of a suitable surfactant.

The process of laundering as commonly used subject fabrics to the combined action of water, soap, temperature and pressure.

Washing of clothes is one of the oldest household tasks. But many women do not wash their clothes properly due to the lack of scientific knowledge of the types of washing methods and detergents to be used for particular fabrics.

Today various types of cleansing agents are coming in market. Consumer becomes confused in selection the proper cleansing agent for a particular fabrics. Some are the proper cleansing agent like reeta nut, shikakai, green gram powder, Bengal gram power used in previous days for washing purpose. Synthetic cleansing agents are mostly used by the house-wives than natural cleansing agents.

In previous days when washing was done on rivers edges, it was found that some types of clays or wood ashes when used with water helps then to get their clothing cleaner. After a time they notice that combination of fat with an alkali substance increase their cleansing quality. In 1800 two freneh men chavrell and Lablance discovered the chemical process which is the base of soap-making today.

Soap is a good cleansing agent but do not perform well in hard water. Detergents are not affected by hard water . Soap and detergent should be used carefully,

Because of some detergent includes strong alkalies. They can be harmful to the delicate fabric like silk. Different methods of washing used for cleaning the fabric like silk. Different methods of washing used for cleaning the fabric such as friction washing, squeezing and kneading , washing by machine, dry cleaning. It is essential to confirm which washing method is suitable for washing silk. Because it is a delicate fibre some washing methods can weaken it.

Objectives

1) To see the effect of natural and synthetic cleansing agents on silk fabric.
2) T see the effect on strength of the fabric and colour fastness by using different washing methods.

Methodology

The methodology is subdivided under the following heads

(A) CONDUCTING THE SURVEY
  (1) Selection of sample
  (2) Collection of Data

(B) EXPERIMENTAL PROCEDURE
  (1) Selection of Fabric
  (2) Selection of Natural cleansing Agents
  (3) Selection of synthetic cleansing Agents
  (4) Selection of washing method

(5) Laundring procedure

(6) Finding parentage of Alkali in shop solution.

(C) LABBORATORY TESTS

(1) Fabric weight

(2) Fabric count

(3) Breaking strength

(4) Bursting strength

(5) Tearing strength

(A) CONDUCTING THE SURVEY :

(1) **Selection of sample:** The samples were chosen on the basis of random sampling and survey was carried out by questionnaire-cum interview methods.

(2) **Collection of Data :** A survey was done by the investigator to select which synthetic cleansing agents have more demand in the market at present. And second survey was conducted to see which washing methods are used by housewives for washing silk commonly.

(B) EXPERIMENTAL PROCEDURE :

(1) **Selection of Fabric material** : Two meters of silk fabric was purchased from `Rajanigandha silk Emporium, Nagpur` The color of the fabric was green. The silk fabric was mulberry silk of silk centre, Bhandara' 12 " X 16 " piece of fabric was taken for each laundering test. And remaining silk fabric was taken for each laundering test. And remaining silk fabric was kept for comparative test.

(2) Selection of natural cleansing Agents : Four natural cleansing agents such as Reeta-nut, shikakai were selected on the basis of their acidic nature.

(3) **Selection of synthetic cleansing Agents** : Synthetic cleansing agents such as Nirma and surf were selected. The reason for selecting synthetic cleansing agents is that these synthetic cleansing agents are common in use than natural cleansing agents. Because of some of their good cleansing qualities and providing more foam.

(4) **Selection of washing methods:** Three washing methods Hand friction, Squeezing and kneading and Dry-cleaning were selected.

(5) **Laundering Procedure** : For laundering 1% of soap solution was prepared and poured in water bath. The two pieces of samples of size 12"X16" were cut. Immersed in

prepared soap solution and kept for 10 minutes at about 40^0 c. Then the samples were taken out and washed by squeezing, kneading and hand-friction methods respectively.

(C) LABORATORY TESTS : For the present study, to evaluate the difference between original and tested samples, the following tests were conducted by the investigator:

1. Fabric weight
2. Fabric count
3. Breaking strength
4. Bursting strength
5. Tearing strength

Result and Discussion

The main objectives this research was to assess to see the effect of selected cleansing agent and different washing methods on silk fabric. The results of this research are discussed under the following heads :

(1) Summary of survey

(2) Results of the laboratory tests.

(1) (a) **Result of Market survey**

20 % Shopkeepers said that in washing powder Nirma was found more preferred because of its cheaper price and attractive advertisements. Surf is also preferred by many people for washing delicate fabric.

(b) **House-wives survey result**

The results of survey on preference of natural and synthetic cleansing agents shows that 40% use natural cleansing agents for washing silk fabrics and 60% use synthetic cleansing agents and all house-wives place the washed fabrics for drying in shade.

(2) Result of Laboratory Tests :

TABLE I (a)

Fabric weight (squeezing and heading Methods)

Fabric weight in m. gms.

Sample	Before laundering	After Laundering	Loss in %	‘ t; value
Dry-clean	307	289	6.23	.09
Reeta-nut	307	290	5.53	.03
Shikakai	307	287	6.51	.03
Nirma power	307	268	12.70	.16

Surf powder	307	282	9.44	.09

- Insignificant at 5% and 1 % level

TABLE I (b)

Fabric weight (Hand Friction)

Sample	Before Laundering	After Laundering	Loss in %	' t ' Value
Reeta nut	307	287	6.51	.03
Shikakal	307	284	7.49	.03
Niram power	307	260	15.30	.18
Surf powder	307	278	9.44	.09

- Insignificant at 5 % and 1%

From the Table Nos . I (a) and I (b) it was observed that weight of all the sample was reduced after laundering.

The samples washed by hand-friction method with Nirma lost maximum amount of weight when compared to other methods of washing along with different cleansing agent.

Student't ' test reveals that percentage decrease in weight is not significant at 5% and 1% levels.

Fabric counts : With the help of pick glass number of warp and weft per inch were counted and results are show in the following Tables :

Table II (a)

Farbric count – squeezing and kneading methods.

Sample	No. of Warps per inch	Gain in %	' t ' Value	No. of Sefts Per inch	Gain in %	' t ' Value
Original Sample	102			97		
Dry-clean	103	.98	3.16**	100	3.09	9.48
Reeta nut	108	5.08	18.96**	104	7.21	22.12**
Shikakai	104	1.96	6.32**	100	3.09	9.48**
Nirma Powder	103	0.98	3.16**	101	4.12	12.64**
Surf powder	109	6.86	22.12**	104	7.21	22.12**

(a) Fabric counts : With the help of pock glass number of warp and weft per inch were counted and results are show in the following Tables :

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Shikakai	104	1.96	6.32**	100	3.09	9.48**
Nirma Power	103	0.98	3.16**	101	4.12	12.64**
Surf power	109	6.86	22.12**	104	7.21	22.12**

Table II (b)

Farbric count – Hand friction methods.

Sample	No. of Warps per inch	Gain in %	' t ' Value	No. of wefts Per inch	Gain in %	' t ' Value
Original Sample	102			97		
Dry-clean	103	.98	3.16**	100	3.09	9.48
Reeta nut	107	4.90	15.80**	104	7.21	22.12**
Shikakai	106	3.92	12.64**	103	6.18	18.97**
Nirma Power	107	4.90	15.80**	100	3.09	9.48**
Surf power	111	8.82	28.44**	105	8.24	28.28**

** significant at 5% and 1% level.

From the Table II (a) & II (b) it was observed that, fabric count of all samples was increased in number of both warpwise and weftwise in all samples. But increased in warpwise was more. In hand-friction methods fabric count was increased than squeezing and kneading and dry-cleaning.

Student ' t ' test reveals that percentage increased in fabric count is significant at 5% and 1% levels.

Table III (a)

Breaking strength Test(squeezing and kneading)

Sample	Warp wise breaking strength (kg per cm)	Loss in %	' t ' Value	Weft wise breaking strength (kg per cm)	Loss in %	' t ' Value
Original Sample	38.03			32		
Dry-clean	35.04	7.57	9.17**	31.00	3.12	3.16
Reeta nut	34.05	9.92	12.008**	31.03	2.18	2.212**
Shikakai	32.02	15.92	19.276**	30.03	5.21	5.372**
Nirma Power	22.00	42.55	51.508**	20.00	37.5	37.92**
Surf power	26.00	31.11	38.868**	25.00	21.87	22.12**

** significant at 5% and 1% level.

Table III(b)

Breaking strength Test(hand friction method)

Sample	Warp wise breaking strength (kg per cm)	Loss in %	' t ' Value	Weft wise breaking strength (kg per cm)	Loss in %	' t ' Value
Original Sample	38.03			32		
Dry-clean	35.04	7.57	9.17**	31.00	3.12	3.16
Reeta nut	34.05	9.92	12.008**	31.03	2.18	2.212**
Shikakai	32.02	15.92	19.276**	30.03	5.21	5.372**
Nirma Power	22.00	42.55	51.508**	20.00	37.5	37.92**
Surf power	26.00	31.11	38.868**	25.00	21.87	22.12**

** significant at 5% and 1% level.

From the table nos III(a) and III (b) it was found that breaking strength of all samples was reduced after laundring. The sample washed by hand and friction method with nirma losed maximum amount of strength. The maximum strength lost in wept wise direction than warp wise direction when compare to other methods of washing along with different cleansing agent.

The Student ' t ' test reveals that percentage decreased instrength is significant at 5% and 1% levels.

Bursting strength

Table IV (a)

Bursting strength (squeezing and kneading method)

Sample	**Bursting strength** (kg per cm)	Loss in %	' t ' Value
Original Sample	10.00		
Dry-clean	9.7	3	.95*
Reeta nut	8.00	20	6.32**
Shikakai	7.8	22	4.04**
Nirma Power	6.2	38	12.01**
Surf power	8.00	2	6.32**

* insignificant at 5% and 1% level.

** significant at 5% and 1% level.

Table IV (b)

Bursting strength (hand friction method)

Sample	**Bursting strength** (kg per cm)	Loss in %	' t ' Value
Original Sample	10.00		
Dry-clean	9.07	3	.95*
Reeta nut	7.00	30	9.48**
Shikakai	7.4	26	8.22**
Nirma Power	6.1	39	12.32**
Surf power	7.9	21	6.64**

** significant at 5% and 1% level.

From the table nos IV(a) and IV (b) it was found that bursting strength of all samples was reduced after laundring. The sample washed by hand and friction method with nirma losed maximum amount of strength. The maximum strength lost in wept wise direction than warp

wise direction when compare to other methods of washing along with different cleansing agent.

The Student ' t ' test reveals that percentage decreased instrength is significant at 5% and 1% levels.

Tearing strength

Table V(a)

Tearing strength (squeezing and kneading method)

Sample	Warp wise mean tearing strength (kgs)	Loss in %	' t ' Value	Weft wise mean tearing strength (kgs)	Loss in %	' t ' Value
Original Sample	1.920			1.600		
Dry-clean	1.680	12.5	.76*	1.560	2.5	.13*
Reeta nut	1.612	16.04	.98*	1.552	3	.16*
Shikakai	1.600	16.66	1.01*	1.440	10	.51*
Nirma Power	1.320	31.25	1.90*	1.040	35	1.77*
Surf power	1.600	16.66	1.01*	1.568	2	.13*

* not significant at 5% and 1% level.

Table V(b)

Tearing strength (Hand friction method)

Sample	Warp wise mean tearing strength (kg per cm)	Loss in %	' t ' Value	Weft wise mean tearing strength (kg per cm)	Loss in %	' t ' Value
Original Sample	1.920			1.600		
Dry-clean	1.680	12.5	.76*	1.560	2.5	.13*
Reeta nut	1.552	19.16	1.17*	1.542	3.62	.19*
Shikakai	1.440	25.00	1.52*	1.408	12.00	.63*
Nirma Power	1.320	31.25	1.90*	1.327	17.00	.88*
Surf power	1.600	16.66	1.01*	1.558	.38	.16*

*not significant at 5% and 1% level.

From the table nos V(a) and V (b) it was found that tearing strength of all samples was reduced after laundring. The sample washed by hand and friction method with nirma losed maximum amount of tearing strength. The maximum strength lost in wept wise direction than warp wise direction, when compare to other methods of washing along with different cleansing agent.

The Student ' t ' test reveals that percentage decreased instrength is not significant at 5% and 1% levels.

Summery and Conclusion

From the result and discussion it was found that silk fabric was subjected to different laboratory tests, such as, finding percentage of alkali in washing agents; fabric weight; fabric counts; breaking, bursting and tearing strength.

Breaking, bursting and tearing strengths got decreased after laundering in all the sample.

The sample was washed by squeezing and kneading methods and dry-cleaning methods was found to be best for laundering the silk articles.

In natural cleansing agents, reeta-nut is the best cleansing agent for coloured silk regarding colour. In synthetic cleansing agents surf powder was found best than NIRMA powder. In washing method, dry-cleaning is the best method for silk. Squeezing and kneading method ranks second.

In natural cleansing method, reeta-nut is best cleansing agent. Surf was found best among synthetic cleansing agents and in washing methods, dry-cleaning is the best method for silk.

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23. Assessment of Avian Population in and around Mahatma Jyotiba Fule Mahavidyalay, campus, Bhatkuli, dist. Amravati (M.S.)

Dr. A. B. Ingole
Asst. Professor, Mahatma Jyotiba Fule commerce, Science VR Arts college, Bhatkuli, District Amravati

Abstract

Study of bird diversity in college campus Bhatkuli was done over a period of four month from December 2017 to April 2018. A total no. of 34 birds was recorded during the study. The common bird species were crow, house sparrow, house crow, blue rock pigeon, common myna, etc. the college campus has wide variety of tress, which may be one of the major contributing factor for the richness of bird species.

Keywords- common myna, spotted dove, blue rock pigeon, house crow

Introduction

Birds are chordate belonging to class Aves. Aves are the Latin name for birds-feathered, winged, bipedal, warm blooded egg laying Vertebrate animal. They inhibit the ecosystem across the globe. Birds are some of the most prominent species of the earth's biodiversity and sensitive to environmental changes (Dayananda G 2009.)

Birds are very important ecological indicators to understand the quality of habitats. Present status of bird's diversity has been decreasing due to the destruction of natural habitats and anthropogenic activities (Grewal B 2000). The destruction of different types of habitats by cutting food provide trees and foraging plant for house hold use of woods and require land for residential purposes are the main factor responsible for lower down in bird foraging habitat and their nesting sites. Therefore the majority of avian species are unknowingly enters to inhibit in the urban areas (Joshi PP 2001).

According to new research led by American museum of National history suggest that there are about 18000 bird species in the world. A check list of birds of Indian authored published by the Indian journal 2016 by (Praveen et al the Indian 2016). There are about 1263 species of birds present in India and about 358 species of bird found in Gorakhpur region (Khan

MMH2008, Mohsanin S, Khan MMH 2009, Reza AMS, Hossain M, Parween S 2012). No research on bird diversity their population and assessment was carried out in the selected study area of college campus. Present study helps to prepare a base line data on avian diversity with their relative abundance occurrence in MJF college campus Bhatkuli.

Method and material

Bhatkuli is a large village about 26 Km away from Amravati city. The study area was visited 4 day in a month. The detailed survey was conducted in the early hours 6 am to 9 am and evening hours (4 to 6pm) from December 2018 to April 2019. Birds were counted by transect line point counting and look & see method. A field binocular with magnificence 10 x 50 was used to observe and identify bird's species. Observation was made by standing & seating from hiding place photographs are taken. Birds were recognized by fixing eye on them. Continuous observation were made regarding their movement, songs, feeding habits, size, shape, strips and patches of color, eye line, nape color, eye arcs were noted during stationary stage or flying stage. Observation was confirmed with the help Avibase bird count (2013).

Result & discussion

After our continuous observation of four months that is from December 2018 to April 2019. We have identifies the birds' species which are listed below in table: 1

Table 1: Most frequently found birds in college campus

Sr.No.	Common name of Birds	Scientific name	Status in campus
1	House Sparrow	Corus splendens	widespread
2	Common sparrow	Passer domasticus	widespread
3	Common myna	Acridotheres tristis	widespread
4	Rock pigeon	Petronia Bucerotidae	widespread
5	Rose-Ringed Parakeet	Pstittacula Krameri	widespread
6	Indian Koyal	Eudynamys	Rare
7	Brahmini myna	Sturnia pagodarum	Rare
8	Pide myna	Amandava	Rare
9	Red munia	Amandava	Rare
10	Common hill myna	Gracula Religisa	Rare
11	Indian Roller	Coracias Benghalensis	widespread
12	Common Dove	Columbidae	widespread
13	Spotted dove	Spilopelia Chinensis	widespread
14	Rose ringed Paraket	Psittacula krameri	widespread

15	White bristled kingfisher	Alcedinidae dicrorus adsimilis	widespread
16	Black drongo	Dicrus caerulescens	widespread
17	Spotted egle owl	Bubo africanus	Rare
18	Spotted owl	Strix occidentalis	Rare
19	Rock pigeon	Columba livia domastica	Rare
20	Red vented bulbul	Pycnonotidae	Widespread
21	Greattle coucal	Gracupiacontra	Rare
22	Male koyal	Eudylamys scolopaccos	Rare
23	Shikra	Accipiter badius	Rare
24	Wood picker	Picidae	Widespread
25	Cattle Egrate	Bubulcus ibis	Widespread
26	Rocks sparrow	Petronia	widespread
27	Pond herron	Ardeola Leucoptera	widespread
28	Cattle egret	Bubulcus ibis	Rare
29	Black kite	Milvus migrans	widespread
30	Red Wattled Lopwing	Vanellus indicus	Widespread
31	Grey horn bill	Ocyceros birostris	Rare
32	Babbler	Argya caudate	Widespread
33	Great Tit	Parus Major	Seasonal
34	Rosy Starling	Pastor roseus	Rare

The most frequently found birds are House sparrow, common myna, house crow, common dove, pigeon, Red myna, rose ring parakeet. Some birds are rarely sighted during study periods such as spoted dove, red drongo, white drongo, & owl. The species diversity and status of each bird species in different habitat were as different cover is also different.

The majority of birds was observed in college campus and also has wide range of trees such Eucalyptus, banyan, peeple, ashok, neem. These trees give habitat for different species of birds. The birds were observed in and around college campus .This may be due to large variety of plant which provided shelter as well as food and safety for birds. Comparative data clearly indicates that college campus has recorded highest diversity in the garden and lowest near the main office which shows encroachment of students and staff members in that area. This study shows the positive relationship between healthy ecosystems to bird which are recorded.

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24. In Vitro Evaluation of Various Extracts of Annona Squamosa L. Against Human Pathogenic Fungi

R. M. Kagne
Dept. of Botany, Vasantrao Naik College, Vasarni, Nanded.

Abstract

Annona squamosa L. of Annonaceae is widely distributed in India. It has insecticidal, anthelmintic, anti-spasmodic, emmenagogue, diaphoretic, anti-pyretic, anti-periodic and alexeteric properties. Candida albicans causes candidosis and Epidermophyton floccosum causes dermatophytosis. It also invades skin and nails. It is a infectious agent in immunocompromised patient with Behcet□s syndrome. Aqueous, ethyl alcohol and ethyl acetate hot extracts of leaves, bark, roots & seeds were investigated for their antifungal activity. The growth inhibition was determined using food poisoning method against human pathogenic fungi. It was observed that ethyl acetate extract showed maximum inhibition than ethyl alcohol extract followed by aqueous extract against the selected human pathogenic fungi.

Introduction

Search for newer drugs from plants has been on the rise since many of the micro-organisms including fungi are posing serious health related disorders. Probably this may be due to the prolonged and indiscriminate use of antibiotics increase in number of immunocompromised patients. In addition, many of the existing drugs cause various side-effects. Drug development from plant based compounds could be useful in meeting this demand for newer drugs with minimal side-effects. The vast plant biodiversity of our country is presently under explored and many plants could be the source of novel drugs. (S.Madhumathi, et.al.2000)

Plants which have been used as medicine over hundreds of years, constitute and obvious choice for study. It is interesting to determine whether their traditional uses are supported by actual pharmacological effects or merely based on folklore. Biologically active compounds from natural sources have always been of great interest to scientists working on infectious diseases. In the recent years there has been a growing interest to evaluate plants possessing antimicrobial activity for various diseases. (Clark & Hufford, 1993). A number of studies have been reported

dealing with antimicrobial screening of extracts of medicinal plants. (Malcom & Sofawora, 1969). The great interest in the use and importance of Indian medicinal plants by the WHO in many developing countries has led to intensified efforts on the documentation of ethnomedicinal data of medicinal plants (Dhar et.al.1968).

Fungi cause important human disease especially in tropical regions. Despite the existence of potent antifungal agents, resistant or multi-resistant strains are continuously appearing, imposing the need for a permanent search and development of antifungal compounds.

Candida albicans infects skin causing candidosis while Epidermophyton floccosum is one of the common causes of dermatophytosis infecting skin (Tinea corporis, tinea cruris, tinea pedis & nail onychomycosis). Candidosis & dermatophytosis are the most common forms of fungal infection in many countries (Odds, 1988, Ribbon 1988). Treatment demands the use of antifungal agents such as griseoflulvin and Amphotericin B (Koening, 1995). However, the high cost of this kind of treatment, especially in developing countries, the long period of therapy and the possibility of the emergence of resistant strains may hinder the eradication of these diseases (Baker et.al. 1989, Willocks et.al.1991). The screening the traditional medicinal plants may offer potential resources since there is widespread in rural areas, with much of the population relaying on them (Gadhi, C.A. et.al. 2001).

A.squamosa of Annonaceae locally known as □Sitaphal□ is widely cultivated throughout India. It is commonly observed in throughout the region of Marathwada. This plant is a well branched small tree or shrub 7 m height and bear edible fruits called sugar-apples. The roots, leaves and seeds of this plant used medicinally and contain anonaine alkaloids.

Materials and Methods

Collection of plant material

The plant parts of A. squamosa collected from different regions of Marathwada particularly Nanded District and was immediately identified botanically on the spot in the field by using Flora of Marathwada (Naik, 1998). The plants parts collected were shredded and dried completely at 50^0C for 72h. The dried material were then ground into fine powder and stored in airtight container at room temp. till extraction.

Cultures

The fungal human pathogen cultures of Candida albicans and Epidermophyton floccosum were obtained from Department of Microbiology, Government Medical College, Aurangabad

and Department of Pathology, Dr.S.C. Govt. Medical College, Nanded. The cultures were maintained on the medium suggested by the respective laboratory and sub-culturing was done fortnightly. The cultures were incubated in an incubator for growth and later were stored in refrigerator.

Extraction of plant material

The plant part powder was added to distilled water/ ethyl alcohol/ ethyl acetate and was allowed to boil for further 4-5 minutes on a water-bath under hood. 10ml of ethanol was used for every gram of powder. The extract was cooled and contents were homogenized thoroughly in a mortar and pestle. The extract was filtered by passing through several layers of muslin cloth. The residual ground powder was re-extracted by boiling in solvent used earlier for 3 minute to ensure the complete removal of contents. The extracts were pooled, centrifuged at 5000 rpm and the volume was adjusted to represent 10 ml/gram of fresh weight of tissue (ml/gfw).

Plant Extract for Antifungal Properties

Antifungal activity of the plant extracts (free from alcohol/ ethyl acetate and converted into aqueous) was evaluated by well-diffusion method expressed by zone of inhibition mm in diameter for Candida albicans, Epidermophyton floccosum.

The bioassay was carried out by using 1ml of inoculum ($1X10^6$ colony forming units) prepared from an overnight culture for given test fungi. 1ml of the resultant spore /cell suspension was poured in the petri plate and the plates were poured with respective medium to seed each prepared plate. The medium was allowed to solidify. Using a sterilized cork borer, wells of 5mm diameter were made in the solidified inoculated medium and the plate area uniformly. The wells were filled with 0.5ml of extract. Plates were then incubated aerobically at 37± 2 ^oC for 72 h for fungi.

Similarly, wells containing standard concentration of Amphotericin B were used to compare the antifungal property of the plant extract. 1gm of Amphotericin B (Hi-media, Mumbai) was dissolved separately in sterile distilled water and 0.5ml was used to fill the wells.

Results and Discussion

Effect of A. squamosa aqueous extracts

The aqueous extracts of A. squamosa exhibited antifungal activity in terms of perfect inhibition of spore germination of test fungi namely C. albicans and E. floccosum showed that 10% aqueous extracts were more inhibitory to both human pathogenic fungi and with increase in

dilution zone of inhibition of fungi was decreased. Seed extract showed maximum inhibition followed by root and bark extract and it was least in leaf extract. The 10% seed extract gave a 15 mm zone of inhibition in case of E. Floccosum which was more than control i.e. Amphotericin B.

Effect of A. squamosa alcoholic extracts

The alcoholic extract of A. squamosa exhibited antifungal activity in terms of perfect inhibition of spore germination of test fungi namely C. albicans and E. floccosum showed that 10% alcoholic extracts was more inhibitory to both human pathogenic fungi and with increase in dilution zone of inhibition of fungi was decreased. Seed extract showed maximum inhibition followed by root and bark extract and it was least in leaf extract. The 10% seed extract gave a 19mm zone of inhibition in case of E. floccosum which was more than control.

Effect of A. squamosa ethyl acetate extracts :

The ethyl acetate extract of A. squamosa exhibited antifungal activity in terms of perfect inhibition of spore germination of test fungi namely C. albicans and E. floccosum showed that 10% ethyl acetate extracts was more inhibitory to both human pathogenic fungi and with increase in dilution zone of inhibition of fungi was decreased. Seed extract showed maximum inhibition followed by root and bark extract and it was least in leaf extract. The seed extract was more effective in both the test organism compared to control.

It is clear that from the above results the seed extract of the plant showed highest activity in ethyl acetate. However, the activity of leaf was relatively less than the activity of bark of the plant. Similarly, the activity of bark was comparatively less than the root extracts. These results confirm the observations made by various workers with different plant and plant parts. (Cotton 19996, Taylor 1996, Grierson & Afolayan 1999).

Hence from the above results, the seeds of the plant A. squamosa can be used for Integrated Paste Management to control growth of human pathogenic fungi and seeds can be utilized to develop antifungal agents.

Table 01

Effect of A. squamosa L. aqueous extracts on growth of test fungi

Sr. No.	Plant parts	Zone of inhibition (mm)							
		C. albicans				E. floccosum			
		10%	5%	2.5%	C	10%	5%	2.5%	C
1	Leaves	5	4	3	14	9	7	4	12

2	Bark	6	5	4	14	11	9	7	12
3	Root	9	7	6	14	13	11	8	12
4	Seeds	11	8	7	14	15	12	10	12

C □ Amphotericin

Table 02

Effect of A. squamosa L. alcoholic extract on growth of test fungi

Sr. No.	Plant parts	Zone of inhibition (mm)							
		C. albicans				E. floccosum			
		10%	5%	2.5%	C	10%	5%	2.5%	C
1	Leaves	6	5	4	14	13	11	9	12
2	Bark	8	6	14	14	15	13	10	12
3	Root	10	8	7	14	18	16	12	12
4	Seeds	13	11	8	14	19	17	15	12

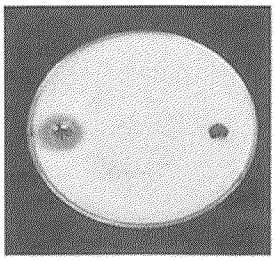
C □ Amphotericin

Table 03

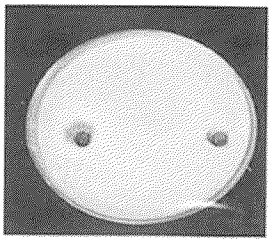
Effect of A. squamosa L. ethyl acetate extracts on growth of test fungi

Sr. No.	Plant parts	Zone of inhibition (mm)							
		C. albicans				E. floccosum			
		10%	5%	2.5%	C	10%	5%	2.5%	C
1	Leaves	16	14	12	14	21	19	17	12
2	Bark	19	17	15	14	22	21	20	12
3	Root	21	18	16	14	24	23	22	12
4	Seeds	22	19	18	14	26	25	23	12

C □ Amphotericin



A



B

Figure Plate showing zone of inhibition *Annona squamosa L.* Extract against :
A: *Candida albicans* B: *Epidermophyton floccosum*

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25. A Study of Water Soluble Fertilizers and Micronutrients on Number of Leaves Per Plant of Banana (CV. Grand Nain)

Patil S. A.
S. S. Bodke
Department of Botany & Horticulture, Yeshwant Mahavidyalaya, Nanded-431 602 (M.S.), India.

Abstract

During the present studies different treatments of water soluble fertilizers were applied to the plants of test banana cultivar during two trial years. From the results it is clear that application of all treatments of the water soluble fertilizers found to be stimulatory for the emergence of increased number of leaves per plant during both the trial years at (three, six and nine months after planting) at every growth stage. Application of M_2 treatment of water soluble fertilizers with micronutrients was found to be superior treatment for the emergence of leaves per plant than the other treatments. It was interesting to note that at the end of the growth stage of nine months after planting, the plants applied with M_2 treatment of water soluble fertilizers with micronutrients showed emergence of more number of leaves

Introduction

The banana (*Musa paradisiaca* L.) an important fruit crop of the world. It is consumed by human beings since centuries long back. It is known to be mans first food and hence called it as Adams fruit. It is highly nutritious. It is cheap and hence nicknamed as **poor man's apple**. Apart from using banana as food, the fruit, leaves and other plant parts are used in several occasions and religious purposes. It is evident from the literature that there are about 250-300 cultivated banana varities in India. About 90 per cent farmers in Nanded district used to grow grand nain cultivar. Grand Nain is suitable for Nanded region in terms of vigour, yield, quality and long shelf-life. The yield and quality of banana requires vegetative growth and good vegetative growth requires recommended dose of macro and micronutrients. The macronutrients (Nitrogen, Phosphorous and Potassium) promote vegetative growth and production. The micronutrients in small dose promote enzymatic activities and synthesis resulting into high yield and quality (Kumar, 2002, Das, 2003). Considering these facts the research topic entitled **Effect of Water**

Soluble Fertilizers and Micronutrients on number of leaves per plant of Banana (*Musa paradisiaca* L.) is selected for the present studies.

Materials and Methods

During the present studies different treatments of water soluble fertilizers were applied to the plants of test banana cultivar during two trial years. The plants under conventional method of application of fertilizers were served as control during both the trial years. The number of emergence of leaves per plant was recorded after three, six, and nine months after planting during first and second year. The fully opened uppermost leaves per plant were counted at three months after planting and tagged. Similarly the leaves per plant were counted after six and nine months of planting and tagged. The sum of leaf count at third, sixth and nine months for both the trial years was considered as the total number of leaves per plant during growing period of the test cultivar.

Treatment Details

The details of application of fertilizers scheduled during the research work are presented in table–V.

Table-V: Details of application schedule of fertilizers

Treatmetns	**Treatment Details**
I. Main Plot treatments	
M_1	50 % RDF through WSF (12:61:00, 13:0:45 and Urea)
M_2	75 % RDF through WSF (12:61:00, 13:0:45 and Urea)
M_3	50% RDF through WSF (Urea, Orthophosphoric acid and White potash)
M_4	75% RDF through WSF (Urea, Orthophosphoric acid and White potash)
M_5	100 % RDF through soil application (Urea, SSP and MOP)
II. Sub-Plot treatments	
S_0	Without micronutrients
S_1	With micronutrients
Replications	4 (Four)
Design	Split plot Design (SPD)
Year (Seasons)	Two (2015-16 and 2016-17)
Location	A/P Pardi (Mukta) Tq. Ardhapur Nanded district of Maharash state

Crop and Cultivar	Banana Cv. Grand Nain
Spacing	Row to row 1.8 meters and plant to plant 1.5 meters
Number of plants/treatmen	16
Total number of plants	640
Total number of treatments	10 (Main plot treatments 5 x Sub-plot treatments 2)

WSF = water soluble fertilizers through fertigation

RDF = Recommended Dose of Fertilizer (200:160:200 grams NPK per plant)

NPK=Nitrogen, Phosphorous and Potasssium

SSP=Single Super Phosphate

MOP=Murate of potash

Results nd Discussion

From the results presented in table-1& 1a it is clear that application of all treatments of the water soluble fertilizers found to be stimulatory for the emergence of increased number of leaves per plant during both the trial years at (three, six and nine months after planting) at every growth stage. Application of M_2 treatment of water soluble fertilizers with micronutrients was found to be superior treatment for the emergence of leaves per plant than the other treatments.

It was interesting to note that at the end of the growth stage of nine months after planting, the plants applied with M_2 treatment of water soluble fertilizers with micronutrients showed emergence of more number of leaves (15.06) which is followed by M_4 (14.44) and M_1 (13.38) where as the plants applied with M_3 treatment of water soluble fertilizers and micronutrients showed emergence of very less number of leaves (12.38) during both the trial years as compared to the controlled M_5 treatment (12.50).

The work on the same line is carried out by different workers like Modi et al (2012), Kumar et al (2012), Selim et al. (2012), Patil and shinde (2013), Krishnamurthy et al . (2013), Eiada and and Mustafa (2013), Kapoor et al. (2014), Venkataramana et al. (2014), Kumar and Ahmad (2014), Marina et al. (2016), Belen et al. (2016), Chongtham et al. (2016) and Hussain et al. (2017).

Table-1: Studies on application of water soluble fertilizers and micronutrients in relation to number of leaves per plant during growing period of Grand Nain cultivar of Banana.

Number of leaves per plant										**Total number of leaves**		
Treat-ments	**3rd MAP**			**6th MAP**			**9th MAP**					
	I year	**II year**	**Pooled**	**I year**	**II year**	**Pooled**	**I year**	**II year**	**Pooled**	**I year**	**II year**	**Pooled**
Main Plot treatments: Water soluble fertilizer treatments (M)												
M_1	10.13	10.25	10.19	11.88	12.00	11.94	13.88	12.88	13.38	35.88	35.13	35.50
M_2	11.88	12.13	12.00	13.00	13.13	13.06	15.13	15.00	15.06	40.00	40.25	40.13
M_3	9.63	10.75	10.19	11.25	11.13	11.19	12.63	12.63	12.62	33.50	34.00	33.75
M_4	10.63	10.75	10.69	12.50	12.50	12.50	14.38	14.50	14.44	37.50	37.75	37.63
M_5	9.25	9.38	9.31	10.63	10.75	10.69	12.38	12.13	12.27	32.25	32.75	32.50
S.Em. ±	0.36	0.24	0.23	0.40	0.42	0.23	0.34	0.34	0.23	0.76	0.77	0.45
CD@5 %	1.11	0.73	0.66	1.22	1.28	0.67	1.03	1.04	0.65	2.33	2.36	1.27
Sub Plot treatments: Micronutrient treatments (S)												
S_0	10.15	10.30	10.23	11.70	11.65	11.68	13.45	13.10	13.28	35.30	35.05	35.18
S_1	10.45	11.00	10.73	12.00	12.15	12.08	13.90	13.75	13.83	36.35	36.90	36.63
S.Em. ±	0.15	0.27	0.15	0.16	0.11	0.14	0.16	0.11	0.14	0.27	0.36	0.28
CD@5 %	NS	NS	0.42	NS	0.34	NS	0.49	0.33	0.41	0.82	1.07	0.80
Interactions												
M×S												
S.Em. ±	0.34	0.60	0.33	0.36	0.25	0.32	0.36	0.25	0.32	0.61	0.79	0.63
CD@5 %	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Y×M												
S.Em. ±			0.32		0.31			0.32				0.63
CD@5			NS		NS			NS				NS

%											
Y× S											
S.Em. ±			0.21			0.20			0.20		0.40
CD@5 %			NS			NS			NS		NS
Y×M× S											
S.Em. ±			0.46			0.45			0.46		0.89
CD@5 %			NS			NS			NS		NS
CV.	8.25	8.73	8.86	7.78	7.05	7.59	8.12	8.37	8.72	9.69	9.23	9.99
GM.	**10.30**	**10.65**	**10.48**	**11.85**	**11.90**	**11.86**	**13.68**	**13.43**	**13.55**	**35.83**	**35.98**	**35.90**

Table-1a: Significance and at par values of number of leaves per plant based on statistical analysis resulted by the treatments of water soluble fertilizers and micronutrients during growing periods of Banana cultivar Grand Nain

No. of leaves

Month	**Year/ Pooled**	**Main Plot**					**Sub Plot**		**Interactions**
3	I Year	M_2	M_4	M_1	M_3	M_5	S_1	S_0	NS
		11.88	10.63	10.13	9.63	9.25	10.45	10.15	
	II Year	M_2	M_4	M_3	M_1	M_5	S_1	S_0	NS
		12.13	10.75	10.75	10.25	9.38	11.00	10.30	
	Pooled	M_2	M_4	M_1	M_3	M_5	S_1	S_0	NS
		12.00	10.69	10.19	10.19	9.31	10.73	10.23	
6	I Year	M_2	M_4	M_1	M_3	M_5	S_1	S_0	NS
		13.00	12.50	11.88	11.25	10.63	12.00	11.70	
	II Year	M_2	M_4	M_1	M_3	M_5	S_1	S_0	NS
		13.13	12.50	12.00	11.13	10.75	12.15	11.65	
	Pooled	M_2	M_4	M_1	M_3	M_5	S_1	S_0	NS
		13.06	12.50	11.94	11.19	10.69	12.08	11.68	
9	I Year								

		M_2	M_4	M_1	M_3	M_5	S_1	S_0	NS
		15.13	14.38	13.88	12.63	12.38	13.90	13.47	
	II Year	M_2	M_4	M_1	M_3	M_5	S_1	S_0	NS
		15.00	14.50	12.88	12.63	12.13	13.75	13.10	
	Pooled	M_2	M_4	M_1	M_3	M_5	S_1	S_0	NS
		15.06	14.44	13.38	12.38	12.50	13.83	13.28	

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