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Indigenous traditional practices for eco-friendly management of insect/pest in Maharashtra, India

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Abstract
An ethnobotanical study on plants used for indigenous traditional management of insects pests by people in Maharashtra was conducted to document the information particularly associated with the use as insecticide and pesticide potential of plants. In this study, following areas from the Maharastra were worked out, Ratnagiri, Raigad and Sindhudurg of Konkan, Toranmal and Dhadgaon areas in Nandurbar district, some areas in Nasik and Ahemdnagar districts. People residing in the villages and nearby forests depends mostly on traditional management of household insects, pests through their own methods use different plants, plant parts, etc. The present paper deals with the plants used to control insects and pests by the people of Maharashtra. A total of 84 plants belonging to 40 families have been documented for their insecticidal/pesticidal potential. Of these, families with more number of species used as insecticide or pesticide are, Fabaceae with 10 species; Lamiaceae with 8 species; Euphorbiaceae with 6 and Asteraceae with 5 species.

Keywords: Traditional knowledge, insect, pest management.

INTRODUCTION

Insects and pests are big enemies of human beings as they destroy crops, stored grains, house hold goods, act as a carrier of diseases of human's and livestock, etc. Chemical insecticides have been used so far to control them but not a single has been proved effective in wiping out them completely and in addition over and unregulated use of these have resulted in soil and water pollution. On other hand traditional knowledge in management of insect, pest developed by ancient people through generations of their interaction with nature and natural resources for medicine, food, fodder and fibre is far better. Indigenous traditional ways of pest control by using plants was once prevalent all over the world but with the advent of modern insecticide and pesticides of synthetic origin it is almost vanished from the developed countries and confined to some regions of developing countries.

Much of the toxicity load of the total planetary environment is due to the long, widespread, and continuing use of persistent and toxic bio-poisons such as the conventional pesticides, herbicides, fungicides etc., giving rise to a distinct Pesticide hazard syndrome, which is now too well known to need formal documentation.

Conventional synthetic insecticides today pose threat of not merely potential but actual human injury and damage to environment – to wit the almost ubiquitous presence of impermissible toxic residues in nearly all biotic and abiotic components of different ecosystems (Gupta and Gupta, 1979)

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Insecticides residues are found in food, water and even in breast milk. It is estimated that in USA alone 200 deaths are occurring every year due to insecticide poisoning (Srivastava, 2002). . WHO estimated that each year there are 25 million cases of pesticide poisoning and as many as 20,000 unintentional deaths, primarily in developing countries (Devkumar and Dureja, 2002). Due to high pesticide residue level recently 130 containers of fresh grapes sent from India were rejected by Netherlands (Nag *et al*, 2004). Government of India has shown concern over the harmful effects of chemical insecticides/pesticides and has banned 23 chemical pesticides so far, 7 have been refused registration and 10 have been restricted for their use in the country (Chandurkar, 2001). The World Wildlife Fund (WWF) has called for a global ban on the production and use of DDT by 2007 (Dureja 2000). Apart from residues, hazards like resistance, cross-resistance, nonspecific broad-spectrum effects, high persistence, secondary pest resurgence etc. are also attributed to conventional synthetic insecticide.

During last few decades, indiscriminate and unabated use of chemical insecticides has resulted in several socio-economic problems, and as a result, the concept of integrated pest management (IPM) has come into existence. Different technologies are used under this program.

Among different technologies used in IPM, the use of botanicals to control household insect-pest is being looked upon as a main source for safer and eco-friendly insecticide/pesticide. Since, botanicals are more eco-friendly, economic, species specific, biodegradable and have lesser or no harmful effects on non-target organisms including human being (Halfield-Law, 2000; Muncuoglu *et al*, 2002) can be possible alternative to the chemical pesticides. Natural/plant products have been used as insecticides by human, since before time of ancient Romans, a practice that continue to the present time (Klocke *et al* 1987). Like-wise there remains rich and diversified flora of India untapped as a source of botanical pesticides.

In the modern era of synthetic organic pesticides only few plants have gained importance as pesticide (Yang & Tang, 1988). This is due to lack of scientific attention rather than the lack of pesticidal potential of plants.

With the foregoing it is apparent that all over the world importance of plant products as an alternative to synthetic insecticides has been considered important. Though various plants have been exploited for their potential as insect control agents, still there is a vast reservoir of plants remains untapped.

MATERIALS AND METHODS

In order to gather information authors has visited selected sites several times and information was obtained by local inhabitants through personal contact and interviews. Frequent field visits in different seasons were organized between the periods of 2008 to 2011. Information was collected through interviews by using a questionnaire. Collected data was confirmed and finalized by repeated visits to the same locality and also to different localities.

Local people accompanied author/s during field visits. For plant collection, processing and preservation, (Jain and Rao, 1977) was followed. The identification of the collected plants was confirmed by using *Flora of Maharashtra State,* (Sharma *et al*., 1996; Singh and Karthikeyan 2000; Singh *et al*., 2001; Cooke,). And regional floras by (Laxminarsimhan, 1996; Pradhan and Singh, 1999 and Sharma and Singh, 2001). The specimens were deposited in herbarium of Deogiri College, Aurangabad.

Enumeration

Plants are enumerated alphabetically in the table with family name in parenthesis, vernacular names, insect/pest against which the plant is used and plant part used are given.

Table. Plants used as insecticides/ Pesticides

Sr. No.	*Botanical name*	Vernacular Name	Used as/against Insect, Pest /Vector	Part Used
1	*Acorus calamus* L. (Araceae)	Yakand	Insecticide	Rt
2	*Haldina cordifolia* (Roxb.) Ridsd (Rubiaceae)	Hedi	Insecticide	Bk
3	*Agave americana* L.(Agavaceae)	Latia-guial	White ants	Lf
4	*Ageratum conyzoides* L. (Asteraceae)	Burandu	Lice in hair	Lf
5	*Albizia lebbeck* (L.) Bth. (Mimosaceae)	Siras	Insecticide	Sd, lf, pd, bk, & rt.
6	*Albizia procera* (Roxb.) Bth. (Mimosaceae)	Safad siras	Insecticide	Lf
7	*Alysicarpus bupleurifolius*(L.) DC. (Fabaceae)	Sewara	Bed bugs, white ants.	Wp
8	*Anacardium occidentale* L. (Anacardiaceae)	Kaaju	White ants, Insecticide	Shell oil
9	*Anamirta cocculus* (L.)Wight&Arn (Minispermaceae)	Kakaphal	Insecticide	Fr
10	*Annona reticulata* L. (Annonaceae)	Ramphal	Body lice , insecticide	Sd, lf & bk
11	*Annona squamosa* L. (Annonaceae)	Sitaphal	Body lice, insecticide	sd, lf & bk, fr, St
12	*Arisaema tortuosum* Schott. (Araceae)	Sardachajad	Insecticide	Tubers
13	*Aristolochia bracteolata* Retz. (Aristolochiaceae)	Gandhati	Insect larvae, insecticide	Juice
14	*Artemisia nilagirica* (C.B.Cl.) Pamp. (Asteraceae)	Davana	Insect repellant Prevent moths	Lf
15	*Azadirachta indica* A.Juss.(Miliaceae)	Nimb	Insecticide Wheat, Rice weevil.	Sd & sd oil, Lf, fr, fl, bk & wp.
16	*Bambusa arundinacea* (Retz.)Willd.(Poaceae)	Kalak	Kill mosquito larvae	Sh
17	*Boswellia serrata* Roxb.ex.Cotebr.(Burseraceae)	Salai	Fumigation repel house files, & mosquitoes	Gum
18	*Brassica campestris* (L.)Clapham (Brassicaceae)	Mohari	Beetles	Sd oil.
19	*Butea monosperma* (Lam.) Taub. (Fabaceae)	Palas	White aunts	Sd, fl extract
20	*Cannabis sativa* L.(Cannabaceae)	Ganja	Bugs & pests	Lf & wp
21	*Careya arborea* Roxb. (Lecythidaceae)	Kumbhi	Kill leaches	Rt, bk & lf
22	*Carissa congesta* Wight. (Apocynaceae)	Karvand	Vet worms in wounds.	Rt & bk.
23	*Cassia hirsuta.* L (Caesalpiniaceae)		Insecticide	Bk
24	*Cassytha filiformis* L. (Lauraceae)	Amarval	Insecticide	Wp
25	*Vernonia anthelminticum* (L.)Willd (Asteraceae)	Kadu jera	Fleas	Sds
26	*Cinnamomum camphora* (L.) Nees & Ebern. (Lauraceae)	Camphor	Protect clothes against insects	Bk powder
27	*Citrus limon* L.Burn.f. (Rutaceae)	Gadha-limbu	Wheat weevil & flour beetle.	dried lf
28	*Cleistanthus collinus* (Roxb.) Bth.ex.Host.f. (Euphorbiaceae)	Garavi	Insect repellent,	Rt, lf, bk,. St ,fr.
29	*Commiphora wightii*(Arn.) Bhandari. (Burseraceae)	Gugal	Mosquito repellant	Resin.
30	*Corypha umbraculifera* L. (Arecaceae)	Tali	Insect repellant	Young fr
31	*Croton roxburghii* Balakr. (Euphorbiaceae)		Insecticide	Sds
32	*Cucumis melo* L. (Cucurbitaceae)	Mekk	Lice in hair	Lf.
33	*Cucumis sativus* L.(Cucurbitaceae)	Kakadi	Kill lice & insects	Rh
34	*Curcuma longa* L. (Zingiberaceae)	Haldi	Drive away ants	Rh
35	*Cuscuta reflexa* Roxb. (Cuscutaceae)	Marwel	Kills lice.	Wp
36	*Cymbopogan nardus* (L.)Rendle.	Gavatichaha	Mosquito repellent	Wp
37	*Derris scandens* (Roxb.) Bth. (Fabaceae)		Insecticide	Lf, bk
38	*Derris trifoliate* Lour. (Fabaceae)	Kajal vel	Insecticide	Bk
39	*Dioscorea hispida* Dennst. (Dioscoreaceae)	Vaskand	Insecticide	Bk
40	*Duranta erecta* L. (Verbenaceae)	Duranta	Insecticide	Wp
41	*Euphorbia antiquorum* L. (Euphorbiaceae)	-	Maggots in wound	Milky juice
42	*Euphorbia dracunculoides* Lam. (Euphorbiaceae)	Pisola	Kills lice	Latex
43	*Euphorbia thymifolia.* L (Euphorbiaceae)	Lahan-nayati	Flies, mosquitoes	Wp
44	*Fioria vitifolia* (L.) Mattei. (Malvaceae)	Van-kapus	Kill lice	Rt. bk
45	*Gloriosa superba* L. (Liliaceae)	Bachnag	Lice in the hair	Lf
46	*Hardwickia binata* Roxb. (Caesalpiniaceae)	Anjan	Insecticide	Wood

47	*Harpullia arborea* (Blanco) Radlk (Sapindaceae)		Leech repellant	Bk
48	*Holarrhena pubescens* (Buch-Ham) Wall. (Apocynaceae)	Kuda	Insecticide	Fl, sd
49	*Hyptis suaveolens* (L.) Poit. (Lamiaceae)		Repel bed bugs	Twig
50	*Kalanchoe integra* (Medik)O. Kize.(Crassulaceae)		Insecticide	Lf`
51	*Lagenandra ovata* (L.)Thw. (Araceae)	Vatsanab	Insecticide	Wp
52	*Madhuca langifolia* (Koen.)Mac. (Sapotaceae)	Mohva	Worm killer Insect repellent	Residual cake, Sd & Sd oil.
53	*Madhuka latifolia* (Roxb.) Chev.(Sapotaceae)	Mohva	Insecticide/warm killer	Oil cake / ,sd
54	*Melaleuca leucadendron* (L.) L. (Myrtaceae)	Cajuput tree	Mosquito repellent	Oil
55	*Melia azadarach* L. (Miliaceae)	Bakan nimb	Insecticide	Fr, sd
56	*Millettia extensa*(Bth.) Baker.(Fabaceae)		Insecticide	Rt
57	*Mimosa pudica.* L (Mimosaceae)	Lajalu	Veterinary wound maggots	Lf
58	*Mundulea sericea* (Willd.) A. Chev.(Fabaceae)	Supti	Insectcide& pesticide,	Sd, rt, & bk.
59	*Nigela sativa*(Roxb.) DC. (Ranunculaceae)	Kalajeera	Pesticide, insecticide	Sd
60	*Ocimum americanum*. L (Lamiaceae)	Ran-tulsi	Insecticide	Wp
61	*Ocimum tenuiflorum* L. (Lamiaceae)	Tulas	Insect repellent	Wp
62	*Ougeinia oojeinensis* (Roxb.)Hochr. (Fabaceae)	Thisa	Insecticide	Bk, St bk.
63	*Peganum harmala.* L (Zygophyllaceae)	Harmal	Mosquito repellant	Rt
64	*Pongamia pinnata* (L.) Pierre. (Fabaceae)	Karanj	Repellant & insecticide.	Sd, rt & Sd oil.
65	*Catunaregam spinosa* (Thumb.)Tivveng (Rubiaceae)	Gehela	Insecticide	Bruised fr
66	*Ricinus communis* L. (Euphorbiaceae)	Erand	Flies repellant, Rice moth & rice weevil	Sd oil
67	*Ruta chalepensis* L. (Rutaceae)	Satap	Insects	Wp
68	*Sarcostmma viminale* (L.)R.Br. (Asclepiadaceae)	Soma	White ants	Lf
69	*Stephania japonica* (Thumb)Miers (Minisparmaceae)	Pahad val	Strong poison to frogs	Wp
70	*Strychnos nuxvomica.* L (Logamiaceae)	Kajra	White ant	Fr, Sd
71	*Tephrosia purpurea* (L.) Pers. (Fabaceae)	Sarpunka	Cotton & woolen cloth mouths,	Wood, Rts.
72	*Trachylobium ammi.* (L.) Sprague (Apiaceae)	-	Mosquitoes Repellant	Sd
73	*Trigonella foenum- graecum* L.(Fabaceae)	Methi	Insect repellent	
74	*Vitex negundo* L. (Verbenaceae)	Nirgudi	Insect repellent.	Lf
75	*Vitex trifolia* L. (Verbenaceae)	Lingad	Insect repellent	
76	*Artemisia japonica* Thumb. (Asteraceae)	Tel dewan	Insecticide, housefly repellant	Wp
77	*Blumea eriantha* DC. (Asteraceae)	Buradi	Mosquito repellant	Wp
78	*Calotropis procera* (Ait.) R.Br. (Asclepiadaceae)	Akdo	Larvicidal, insecticide	Lf
79	*Lavendula bipinnata* O. Ktze (Lamiaceae)	Ghodeghui	Insect repellant	Wp
80	*Lavendula lawii* Wight. (Lamiaceae)	Nivale	Insect repellant	Wp
81	*Leonotis nepetaeforia* (L.)R.Br.(Lamiaceae)	Dipmal	Housefly repellant	Lf
82	*Leucas aspera* (Wild.) Link (Lamiaceae)	-	Insecticide	Wp
83	*Ocimum gratissimum* L. (Lamiaceae)	Ram tulas	Insect repellant	Wp
84	*Antiaris toxicaria* (Pers.) Lesch (Moraceae)	Jasund	Insecticide	

CONCLUSION

A total of 84 plants belonging to 40 families have been documented for their insecticidal/pesticidal potential. Of these, families with more number of species used as insecticide or pesticide are, Fabaceae with 10 species; Lamiaceae with 8 speceis; Euphorbiaceae with 6 and Asteraceae with 5 species.

Traditional knowledge of management of insect pest derived through long experiences and perceptions accumulated by traditional farmers during the course of their interactions with the nature and natural resources need thorough validation. Leads obtained from this can incorporated as a better pests and disease management strategies.

Therefore, this rich heritage of the knowledge should be harnesses, preserved, documented and developed as modern science such as indigenous integrated pest management before they are lost.

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