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New host records of coccids in flower and medicinal crops in Tamil Nadu, India

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Abstract
Coccids (Scales and mealy bugs) have attained serious pest status on a wide range of host plants. They have been recorded from 60 plant species of flower and medicinal crops. Most of these belong to the families of Malvaceae, Solanaceae, Asteraceae, Euphorbiaceae, and Amaranthaceae economic damage was observed on flower and medicinal crops. Major species observed are *Phenacocccus solenopsis* Tinsley, *P. madeirensis* (Green) *Rastrococcus iceryoides* (Green) *Nipaecoccus viridis* (Green) *Dysmicoccus brev*ipes (Ckll.),*Coccidohystrix insolita* (Green) *Labioproctus polei* (Green) *Saissetia coffeae* (Walker) *Saissetia oleae* (Bernard) *Parasaissetia nigra* Nietner *Ceroplastes ceriferus* (Fabricius) *Megapulvinaria maxima* (Green) *Eucalymnatus stellatus* (Signoret) *Cerococcus indicus* Maskell *Ceroplastodes cajanii* (Maskell) *Hemilecanium imbricans* (Green) *Aonidiella aurantii* (Maskell) *Hemiberlesia lataniae (*Signoret) *Icerya aegyptiaca* (Douglas) *I. purchasi* Maskell and *Conchaspis angraeci* (Ckll.)

Keywords: Tamil Nadu, India, new host records, coccids, flower and medicinal crops

Introduction
Floriculture is a fast emerging major venture in the world, as a potential money -spinner for many third-world countries. Many flowers and ornamental plants are grown for domestic as well as for export market and provide more return / unit area than any other horticultural crop. Growing of cut flower, suited for flower arrangements / decorations and bouquets, has increased substantially and its share of the total trade has also improved. Top twelve cut flowers preferred in international market are rose, tulip, chrysanthemum, gerbera, carnation, freesia, lilly, iris, anthurium, orchids, gypsophilla, etc. Cultivating flowers and gardening have been practiced in India for many centuries. The total area under cultivation of different flowers in India is 80,000 hectare. Though all states in India, have a tradition of growing flowers, the commercial cultivation of flowers are presently confined to Karnataka, Tamil Nadu, Andhra Pradesh, West Bengal, Maharashtra, Rajasthan, Uttar Pradesh, Delhi, Haryana. The major flowers grown in India are marigold, aster, roses, tuberose, gladiolus, jasmine, crossandra in open field while gerbera, carnation, rose, anthurium, orchids etc are grown under protected glass house condition. The export of floricultural products of cut flowers from India is of Rs.253 million and the flower export oriented units of rose are present around Bangalore, Pune, Delhi and Hyderabad.
The major cut flowers producing states are Karnataka, Tamil Nadu, West Bengal, Andhra Pradesh, Maharashtra and Uttar Pradesh. In loose flowers production, Tamil Nadu ranks first (24.7%) followed by Karnataka (23.1%), West Bengal (9.3%), Andhra Pradesh (9.0%) and Rajasthan (7.4%).
Medicinal plants are the local heritage with global importance. In Ayurveda about 2,000 plant species are considered to have medicinal value (Purohit and Vyas, 2007).
The principal herbal drugs are available in good market in foreign countries are *Aconite*, *Aloe*, *Belladona*, *Acorus*, *Cinchona*, *Cassia tora*, *Dioscorea*, *Cassia* (*Senna*) etc.
In comparison to other commercial crops large-scale cultivation of flower and medicinal plants has many limitations. Depending on the growing conditions, a variety of pests attack the flower and medicinal crops by making holes and eating leaves, buds, flower and fruits, and cause curling, distortion, discoloration, browning and drying of plant parts.

Numerous insects *viz*., sucking pests, defoliators, stemborers and gallmakers and non-insect pests attack different parts of flower crops, thereby, reducing the quality and quantity of production. Sucking pests alone caused 70-80 per cent yield loss.

The crops are prone to insects such as aphids, white flies, scale insects, mites and other pests that are a major obstacle to production. Among them, scale insects and mealy bugs cause a severe damage by reducing the photosynthesis of the plant due to honeydew secretion and sooty mould attack.

The coccids are persistent in nature, their small size makes them difficult to detect and identify in the field and during quarantine inspection. This ability of coccids forming dense colonies particularly within the shoot apex often makes chemical control of this pest quite difficult.

Materials and Methods

Survey

Extensive surveys were made in different flower and medicinal plants growing districts of Tamil Nadu *viz*., Coimbatore, Dindigul, Erode, Madurai, Kanyakumari, The Nilgiris, Trichy and Theni. The infested plant specimens along with predators and parasitoids were collected from all places and brought to the laboratory for further study. The details of methodology followed in this study are given below.

Collection

Coccids were collected by searching the plant parts for the presence of the insects or by the presence of sooty mould attack or by the ants activities which indicated the possible presence of coccids and hence such places were observed and the coccids, if any, were collected. The collected specimens were observed under low power binocular microscope for gross morphological characters, *viz.*, presence of hairs (waxy filaments), setae, cerarii, shape and colour.

Preservation

The coccids were separated from the plant parts and preserved in 90-95% alcohol. Similarly, the infested plant parts were adequately dried in between paper cover and a herbarium was prepared.

Microphotography of coccids associated with host

The infested plant parts containing coccids were photographed with the help of image analyzer and camera (Nikon F4).

Mounting and preparation of permanent slides

Permanent slide preparations are desirable for building up a readily accessible reference collection as well as providing alternative to temporary micro slide preparation for the use of routine identification.

Gently an incision was made with a needle in mid dorsal thorax. The specimen was placed in 10% solution of KOH for about 10 minutes to digest the internal contents. If necessary, the material was kept on a hot water baths in 10% KOH without allowing to boil. In case of mealy bugs, a small hole or incision was made on the lateral side of the body with the help of a pin and the body was slightly pressed with the head of the pin in order to remove the inner contents of the body, till the specimens became clear.

The excess KOH was removed by washing with distilled water. The specimens were removed from distilled water and if necessary, the body contents may be pressed by gentle pressure to remove the inner contents and then transferred to 95-100% alcohol and to carbol xylene for about 10 minutes. After the specimens have cleared, again placed in alcohol for about few minutes to remove the excess carbol xylene. The specimen was again placed in acid alcohol media for about few minutes.

The specimens were stained for about 1 hour in acid fuchsion media and transferred to 95% alcohol for few minutes to remove surplus stain, then transferred to absolute alcohol and to clove oil for 20 minutes.

Specimens were placed dorso-ventrally, on a slide and surplus clove oil was removed by means of fine filter paper. A drop of Canada balsam (or) DPX mountant was placed on the slide and another small drop was placed on the inner side of the cover slip and so as to perfectly cover the drop without any air bubbles. The slides were allowed for drying for few hours either at room temperature or under the heat of table lamp at 40-60º C. After drying, the edge of the cover slip was sealed using nail polish or Canada balsam on a ringing table.

All permanent slides were provided with two labels, one on either side of the slide. Information on the right side includes date of collection, host, locality and the left side includes coccid family, genus, species and collectors name. Details are scribed in slides by using black/green gel pen.

Microphotography of permanent slides

The permanent slides were placed under a phase contrast microscope and photographs were taken by using an image analyzer and camera for easy identification up to generic level.

Camera Lucida drawing of coccid specimen and taxonomic observation

Drawing of coccid structure paves way for identification of the family and genus characters. Aim of the drawing is accuracy rather than artistic, simple line drawings often serve better than elaborately showed. Using a Carl Zeiss phase contrast microscope (Model: Axioster plus), all the coccid specimens on permanent slides were closely examined for taxonomic identification. The dorsum, venter, legs, cerarii, circulus and tri, quinque and multilocular pores, setae, tubular ducts and other striking characters were drawn in butter paper by having a look on drawing tube, which fits into the light path between the eye piece and objective lens of a microscope; it contains a system of prism and mirror so arranged that, by looking through it, both the object under the microscope and the paper on which the drawing is to be made and traced exactly the image that are seen through microscope. This is an ideal method of making drawings of coccids. Elaborate projection can be obtained that will give magnifications ranging from 10 X to 100 X. Drawing was initially done on a butter paper with a pencil and inking was performed by means of rotring isographs (0.1 - 0.6 mm); then the measurements of the important taxonomic structures of coccid specimens were made with the help of a calibrated ocular micrometer and expressed in micrometers. Identification and fixing of the systematic position was undertaken with the help of all the available literature.

Results and Discussion

Of the known 35 families under Coccoidea, 20 families are recognized only in India; five families have been recognized in flower and medicinal crops from Tamil Nadu of which, pseudococcidae is widely prevalent. Suresh and Mohanasundaram (1996) [30] reported that 12 families have been recognized from South India of which, family diaspididae is widely prevalent and subsequently added four more families (Suresh and Chandrakavitha, 2007) [31].

In pseudococcidae**,** eight genera consisting of nine species have been studied. Among them, *Phenacoccus solenopsis* Tinsley was recorded on more than 40 hosts for the first time in India. This pest has been recorded earlier on *Hibiscus Rosa sinensis*

(Ben-Dov, 1994) [2]. The other species studied was *P. solani* (Ferris) on *H. Rosa sinensis* for the first time in Tamil Nadu. Earlier it was recorded on *Chrysanthemum morifolium* (Moghaddam *et al*., 2004) [15]. The increased incidence of the above pests in flower crops may be due to succulent nature of the plant which is more attractive and they are also surrounded by other alternative hosts (Randhawa and Mukhopadhyay, 1998) [20]. *P. madeirensis* (Green) is also recorded for the first time on *Acalypha bicolor*, *Crotons variegatum*, *H. Rosa sinensis* and *Tagetes erecta.* This pest can easily recognized by the presence of egg sac. Increased incidence/outbreak may be due to introduction of this pest either from Pakistan or from Sri Lanka and the absence of efficient natural enemies (Ben-Dov, 1994) [2], with the prevailing hot climatic conditions coupled with increase in reproductive capacity and short life cycle resulted in wider dispersal. Improper use of insecticides also resulted in increased incidence of mealy bugs in cotton. This view is also in accordance with the findings of Surulivelu (2006). Accidental introduction of an insect by travelers or transport into a new area (country) absence of its natural enemies allows it to breed in an unrestricted manner. A modern fast global trade (import and export of commodities) has increased the chances of introduction of foreign pests into areas where they were not present before. Stored grain pests, adult insects which adhere closely to the plant (e.g., scales, mealy bugs and whiteflies) are more liable to be introduced into other countries. Some of the accidentally introduced insect pests into India from foreign countries are the diamond back moth (*Plutella xylostella*) on brassica vegetables, the Coffee berry borer (*Hypothenemus hampei*) on coffee, the San Jose scale (*Quadraspidiotus perniciosus*) on fruit trees on the hills, the serpentine leaf miner (*Liriomyza trifoli*) on tomato, the greenbug (*Coccus viridis)* on coffee according to Jain and Bhargava (2007) [13]. These species were either known pests in the site of origin, or they were of no consequence there and became serious pests in the new country where there were few natural enemies. San Jose scale, *Q. perniciosus* (Comstock), is an example of the former category, being introduced from Southern Asia into the United States of America (Jain and Bhargava, 2007) [13].

An oligophagous mealy bugs *Rastrococcus iceryoides* has been recorded on *Euphorbia multifida* and *Leucas aspera* in Tamil Nadu, India. However, earlier this was recorded on *Cycas* sp. (Ben-Dov, 1994) [2], *H. Rosa sinensis* and *Rosa* sp. (Williams, 2004) [36]. *F. virgata* a polyphagous pest has been observed only on *Acalypha bicolor* and *C.variegatum*. Earlier also this was recorded on *A. bicolor* and *C. variegatum* (Ben-Dov 1994 and Suresh and Mohanasundaram, 1996) [2, 30]. The change in pest status of *Ferrisia virgata* is due to poor competitive ability of the insect with the introduced pest. It is a vector of swollen shoot diseases of cocao.It is widely distributed in India and reported from almost all the states. In dry weather it may move down below ground and inhabit the roots (Hill, 1993) [10].

The present study indicated that *Nipaecoccus viridis* (Newstead) occurred in *Leucas aspera* and *Phyllanthus emblica*. This pest was earlier recorded on *Nerium oleander* (Varshney, 1992; Ben-Dov, 1994; Williams, 2004) [33, 2, 36], *E. officinalis* and *L. aspera* (Williams, 2004) [36] *Abrus precatorius* (Ben-Dov, 1994) [2]. Now it has been recorded on *Mimosa pudica* and *L. aspera* in Tamil Nadu, India. Of late, *E. officinalis* is grown widely for export purpose for its medicinal properties and is grown in all altitudes and wide spread occurrence was noticed in other parts of the country. *E. officinalis* being grown as rain fed crop under water stressed condition paved way for the multiplication of insects. Improper use of insecticides also resulted in increased incidence of mealy bugs in *E. officinalis*. The population is higher in hot climatic conditions coupled with high relative humidity. In the present study *Coccidohystrix insolita* (Green) was recorded on *Coleus aromaticus* and *Solanum khasianum* first time in India. This species was recorded on

H. Rosa sinensis and *C. variegatum* L (Varshney 1992, Suresh and Mohanasundaram, 1996 and Williams, 2004) [33, 30]. Another mealy bugs *Dysmicoccus brevipes* (Ckll.) has been recorded on *Cassia occidentalis* and *Ocimum sanctum* for the first time in Tamil Nadu. Earlier it was recorded on *Heliconia* (Ben-Dov, 1994) [2]. This is a vector of pine apple wilt virus. A flourishing crop when infested suddenly shows the symptom of slow growing poor crop. This is known as 'Quick wilt'. The aerial individuals are to be found mostly at the base of the leaves, which may have to be spread in order to make the bug's evidence Hill (1993) [10]. Maximum population of mealy bugs was noticed during hot climatic conditions and in plains, while hilly region and low temperature with high humid areas the pest incidence was very minimum. In surveyed areas Pechiparai and Ooty population was very low while in the other areas this pest was widely spread in all the flower and medicinal crops.

In the present study, the second widely represented family was coccidae with nine species consisting of seven genera. Among them, *Parasaissetia* is widely prevalent, followed by *Saissetia.* In *Parasaissetia*, *P. nigra* (Nietner) was more predominant in flower and medicinal crops in the plains and higher altitudes. Earlier it was recorded on crossandra (Vadivelu *et al*., 1976) [32]; *Anthurium* sp., *Solanum nigrm* and *Ixora* sp. (Ben-Dov, 1994) [2], *C. variegatum* (Shafee, 1989) [25]; *H. Rosa sinensis* (Hodgson, 1994) [11], *Andrographis panilculata* (Rani and Sridhar, 2005) [21]. Now it has been recorded on *O. sanctum*, *Vitex leooxyrylon*, *GenduRosa vulgaris, Solidago canadensis and A. bicolor* in Tamil Nadu. The continuous occurrence of this insect may be due to its sessile and sticky nature of the insect to the host. The next predominant genus was *Saissetia*, represented by two species. Of them, *Saissetia oleae* (Bernard) was recorded on *Jasminum grandiflorum*. It was recorded earlier on *N. oleander* (Ben-Dov, 1994) [2]. While *Saissetia coffeae* (Walker) occurred along with *Ceroplastes ceriferus* in *Solidago canadensis* and in *Eranthemum* sp. along with *P. solenopsis* Tinsley in hot climatic conditions. Earlier it was recorded on *C. variegatum* (Cockerell, 1893) [5], *Anthurium*

sp. (Green, 1900) [8], Rose (Ramachandran and Ayyar, 1934 [19], Chatterjee and Ayyar, 1936) [4]. *Duranta repens* (Ben-Dov, 1994) [2], *C. variegatum* and *H. Rosa sinensis* (Shafee, 1989) [25], *C. morifolium* and *Solanum nigrum* (Williams, 2004) [36], *Cycas* sp. (Jansen 1995) [14], *Dendrobium* (Hodgson and Henderson, 2000). Now it has been recorded on *A. bicolor* and *S. canadensis* in Tamil Nadu for the first time.

The other minor genera recorded were *Ceroplastodes* and *Ceroplastes*, while *Ceroplastodes cajani* (Maskell) occurred in large numbers on the stem and petiole of the *C. aromaticus* and *C. forskohli*. Earlier it was recorded on redgram and casuarina (Suresh and Mohanasundaram, 1996) [30]. Occurrence on *C. aroamaticus* and *C. forskohli* forms the new host records in Tamil Nadu, India. *Ceroplastes ceriferus* (Fabricius) was recorded in large numbers on the stem and leaves of *Euphorbia* sp. during May-July. Earlier it was recorded on *Ixora* sp. (Suresh and Mohanasundaram, 1996, Williams, 2004) [30, 36]. Now the occurrence on *Euphorbia* sp. forms the additional host records in Tamil Nadu.

Eucalymnatus stellatus is recorded first for the time on young couple plant in Tamil Nadu. Earlier it was recorded on *N. oleander* (Williams, 2004) [36]. *Hemilecanium imbricans* (Green) was mainly found in ornamental shrubs. This pest can be recognized by the presence of white mealy wax / powdery coating on the stem. Earlier it was recorded on *J. multifida* (Ali, 1971 and Shafee, 1989) [25]. Now it has been recorded on *E. officinalis* in Tamil Nadu. The increased incidence may be due to frequent and overuse of insecticides. *Megapulvinaria maxima* (Green) was observed in large numbers on the petiole stem and leaves of *Solanum trilobatum.* Earlier it was recorded on *C. variegatum* and *A. bicolor* (Ali 1971), *Bougainvillea* (Hodgson, 1994) [11], *A. indica* (Suresh and Mohanasundaram, 1996) [30]. Now it has been recorded on *S. trilobatum*. *Cerococcus indicus* was observed in large numbers on stems of *R. nasutus* for the first time in Tamil Nadu, while it was earlier recorded on *H. Rosa sinensis* (Suresh and Mohanasundaram, 1996) [30].

Suresh and Mohanasundaram (1996) [30] reported Coccidae with 18 species in seven genera. Among them *Coccus was* widely prevalent, followed by *Pulvinaria*. The predominant species was *Saissetia oleae* (Bernard) and *Parasaissetia nigra* Nietner occuring on shrubs and trees in plains, while, *Saissetia coffeae* (Walker) occurred in numerous crops in higher altitudes, either alone or along with *Pseudococcus longispinus.*

The third family was diaspididae, in present study only three genera with four species have been collected. Among them, the predominant species is *Aonidiella aurantii* (Maskell) infesting *Rosa* sp., *Euphorbia* sp. and ornamental kalli. Earlier it was recorded on *H. Rosa sinensis*, *N. oleander*, *Rosa* sp. and *J. grandiflorum* (Suresh and Mohanasundaram, 1996) [30]. Now it has been recorded on *Euphorbia* sp. and Ornamental Kalli in Tamil Nadu, India.

Another common species was *Aonidiella orientalis* (Newstead) it occurred in large numbers on stem and leaves. Earlier it was recorded on *N. oleander*, *Adhatoda vasica*, *Jasminum* sp., *Rosa* sp. and *Cycas* sp., *M. koengii* (Suresh and Mohanasundaram, 1996) [30]. *Aspidiotus nerii* Bouche was found on the flower crops such as *N. oleander*. Earlier it was recorded on *Cymbidium*, *N. oleander* (Suresh and Mohanasundaram, 1996) [30]. Now the report on *Euphorbia* sp. forms the new host records of this pest in Tamil Nadu.

Hemiberlesia lataniae (Signoret) was observed on *S. trilobatum* and *M. koengii*. Earlier it was recorded on *N. oleander*. Suresh and Mohanasundaram (1996) [30] reported that *Aonidiella* and *Aspidiotus* on *L. aspera* and *M. koengii*. Like *Aspidiotus*, this genus has also got the potential to withstand extreme weather condition.

The fourth family was monophelbidae, in present study only one genus *Icerya* and two species *viz*., *Icerya purchasi* (Maskell) and *I. aegyptiaca* (Douglas) have been collected. They have been observed on all parts of the plant such as *A. paniculata* and balsam, this genus has also got the potential to withstand extreme climatic conditions. Earlier it was recorded on *Rosa* sp. (Nair, 1975; Srinivasan *et al*., 1974) [17, 28]. Now it has been recorded on *A. paniculata* and Balsam in Tamil Nadu. The increased incidence may be due to high reproduce capacity of the insect and its polyphagous nature of the plant. *I. aegyptiaca* was recorded on *Rosa* sp., *A. bicolor* and *C. variegatum.* Earlier it was recorded on *Rosa* sp. (Rao, 1950) [22]. Now it has been observed on *A. paniculata* and *Hydrophilia auriculata* forms the new host record of this pest.

The other family recorded was Conchaspidae, with a species, *Conchaspis angraeci* (Ckll.) on *Vanilla fragrans* and *A. bicolor*. It was observed mainly on the twigs and leaves. Earlier it was recorded on *Acalypha bicolor* and *H. Rosa sinensis* (Ben-Dov, 1994) [2], *V. fragrans* (Richard *et al*., 2003) [23]. Now the present report on *A. bicolor and V. fragrans* forms the new host records of Tamil Nadu.

V. fragrans is largely grown for export of its essential oil and the increased incidence of this pest may be due to large scale cultivation and also introduction of planting material from other places.

Coccid-Host index for survey places in flower and madicinal crops

S. No.	Name of the insects	Hosts
1.	*Phenacocccus solenopsis* Tinsley	*Hibiscus rosa sinensis* L., *Tagetes erecta*, *Chrysanthemum morifolium*, Verbena, Zinnia, Balsam, *Duanta gold*, *Euphorbia multipida*, *Crotons variegatum*, *Nerium oleander* L., *Eranthemum* sp., *Pseudo Eranthemum* L., *Withania somnifera* L., *Datura metal* L., *Abelmoschus moschataI* L., *Solanum trilobatum* L., *Ocimum basilicm* L., *Ocimum sanctum* L., *Rhinocanthus nasutus* L., *Andrographis paniculata* L., *Widelia chinensis* L., *Solanum khasianum* L., *Abrus precatorius* L., *Artemisia nilagria L.*, *Solanum nigrum* L., *Amaranthus* sp., *Abutilon indicum* L., *Gymnea sylvestris* L., *Solanum trilobatum* L., *Vitex leooryxylon* L., *Strilobanthus cilatus* L, *Acerva lanata* L., *Piper longum* L.
2.	*Phenacoccus madeirensis* (Green)	*Hibiscus rosasinensis* L, *Acalypha bicolor* L. *Tagetes erecta* L, *Crotons variegatum* L.
3.	*Rastrococcus iceryoides* (Green)	*Parijatham* sp., *Leucas aspera* L. *Euphorbia multifida* L.
4.	*Nipaecoccus viridis* (Green)	*Phyllanthus emblica* L., *Mimosa pudica* L.

5.	*Dysmicoccus brev*ipes (Ckll.)	*Ocimum sanctum* L, *Cassia occidentalis* L.
6.	*Coccidohystrix insolita* (Green)	*Coleus forskohli* L, *Solanum khasianum* L.
7	*Planococcus citri* (Risso)	*Manoranjitham* sp.
8.	*Labioproctus polei*(Green)	*Jasminum grandiflorum* L.
9.	*Saissetia coffeae* (Walker)	*Acalypha bicolor* L, *Salidago canadensis* L.
10.	*Saissetia oleae* (Bernard)	*Jasminum grandiflorum* L.
11.	*Parasaissetia nigra* Nietner	*Vitex leooryxylon* L., *Gendurosa vulgaris* L., *Artemisia nilagria* L., *Acalypha bicolor* L., *Salidago canadensis* L.
12.	*Ceroplastes ceriferus* (Fabricius)	*Crotons variegatum* L., *Euphorbia* sp.
13.	*Megapulvinaria maxima* (Green)	*Solanum trilobatum* L., *Azadirachta indica* L.
14.	*Eucalymnatus stellatus* (Signoret)	Young couple plant
15.	*Cerococcus indicus* Maskell	*Rhinocanthus nasutus* L.
16.	*Icerya aegyptiaca* (Douglas)	*Hydrophilia auriculata* L., *Andrographis paniculata*
17.	*Icerya purchasi* Maskell	Ever green flower, Balsam, *Andrographis paniculata* L.
18.	*Ceroplastodes cajanii* (Maskell)	*Coleus aromaticus* L., *Coleus forskohli* L.
19	*Hemilecanium imbricans* (Green)	*Emblica officinalis* L.
20.	*Conchaspis angraeci* (Ckll.)	*Acalypha bicolor* L., *Vanilla fragrans* L.
21.	*Aonidiella aurantii* (Maskell)	*Euphorbia* sp., Ornamental kalli
22.	*Hemiberlesia lataniae* Signoret	*Murraya koengii* L., *Solanum trilobatum* L.
23.	*Aspidiotus nerii* (Bouche)	*Euphorbia* sp.
24.	*Lindingaspis rossi* (Maskell)	*Rosa* sp.
25.	*Pulvinaria maxima* (Green)	*Solanum trilobatum* L., *Azadirachta indica* L.

Conclusion

Floriculture, particularly the cultivation of cut flowers and medicinal plants, holds significant economic potential, especially in developing countries like India. Despite challenges such as pest infestations that affect both the quantity and quality of production, the industry has witnessed growth, particularly in states like Karnataka, Tamil Nadu, and Andhra Pradesh. Various pests, particularly mealy bugs and scale insects, have emerged as major threats to flower and medicinal plant crops, necessitating effective pest management strategies. Additionally, the introduction of foreign pests due to global trade has further complicated the situation. Ongoing research and sustainable agricultural practices are crucial to ensuring the continued success and growth of this promising sector.

References

1. Ali SM. A catalogue of the oriental Coccids. Part V. Indian Mus Bull. 1971;6(2):7-2.
2. Dov BY. A systematic catalogue of the mealy bugs of the world (Insecta: Homoptera: Coccoidea: Pseudococcidae and Putoidae) with data on geographical distribution, host plants, biology and economic importance. Andover, UK: Intercept Limited, 1994, p. 686.
3. Chatterjee H, Ghosh J, Senapati SK. Influence of weather parameters on population fluctuation of major insect pest of mandarin orange (Citrus reticulate Blanco) at Darjeeling district of West Bengal, India. J Entomol Res (New Delhi). 2000;24(3):229-233.
4. Chatterjee NC, Ayyar TVR. Entomological investigations on the spike disease of sandal. Indian For Rec. 1936;1:233-242.
5. Cockerell TDA. The West Indian species of Dactylopius. Entomologist. 1893;26:177-179.
6. Dhawan AK. Emerging pests in North Indian cotton. New Delhi: NCIPM and CICR, Regional Station, Sirsa, 2007, p. 120.
7. Glover PM. Aspidiotus (Furcaspis) orientalis Newstead, its economic importance in lac cultivation and its control. Indian Lac Res Inst Bull. 1933;16:22.
8. Green EE. On a new tea pest from India. Ent Mon Mag. 1900;35:225-226.
9. Henderson PA. Practical Methods in Ecology. Blackwell Publishers, United Kingdom, 2003, p. 151.
10. Hill DS. Agricultural insect pests of the tropics and their control. 1st Indian Ed. New Delhi: Foundation Books, 1993, p. 746.
11. Hodgson CJ. The scale insect family Coccidae: An identification manual. Wallingford, Oxon, UK: CAB International, 1994, p. 639.
12. Hodgson CJ, Henderson RC. In: Coccidae (Insecta: Hemiptera: Coccoidea). Lincoln, Canterbury, NZ: Manakki Whenua Press, 2000, p. 259.
13. Jain PC, Bhargava MC. Entomology: novel approaches. New Delhi: New India Publishing Agency, 2007, p. 533.
14. Jansen MG. Scale insects (Homoptera: Coccinea) from import interceptions and greenhouse in Netherlands. Isr J Entomol. 1995;29:131-146.
15. Moghaddam M, Hatani B, Zibaii K, Sabnalian MR. Report of *Phenacoccus solani* (Coccoidea: Pseudococcidae) from Iran. J Entomol Soc Iran. 2004;24(1):135-136.
16. Mukherjee NG. Handbook of Sericulture. Calcutta: Bengal Secretariat Press, 1919, p. 121-7.
17. Nair MRGK. Insects and Mites of Crops in India. New Delhi: ICAR, 1975, p. 321.
18. Newstead R. Scale insects in Madras. Indian Mus. 1894;3:21-32.
19. Ramachandran R, Ayyar TVR. Host-plant index of Indo-Ceylonese Coccidae. Misc Bull Coun Agric Res India. 1934;4:113.
20. Randhawa GS, Mukhopadhyay A. Floriculture in India. Mumbai: Allied Publishers Ltd, 1998, p. 656.
21. Rani BJ, Sridhar V. Record of arthropod pests on Kalmegh, Andrographis paniculata - an important medicinal plant. Insect Environment. 2005;11(2):89-91.
22. Rao VP. Iceryine scale insects recorded from the Oriental. Indian J Ent. 1950;12:39-66.
23. Richard A, Riviere C, Ryckewaert P, Come B, Quilici S. A new pest of vanilla plantations in Reunion Island, the vanilla scale, Conchaspis angraeci. Phytoma.

2003;562:36-39.
24. Saeed S, Ahmad M, Kwon YJ. Insecticidal control of the mealy bugs *Phenacoccus gossypiphilous* (Hemiptera: Pseudococcidae), a new pest of cotton in Pakistan. Ent Res. 2007;37(2):76-80.
25. Shafee SA. Final report of ICAR Research scheme on "Taxonomic Survey of Coccid and Pseudococcid pests (Homoptera) of various crops with observations on their pteromalid, eulophid and sighniphorid (Hymenoptera) and coccinellid predators (Coleoptera). Aligarh: Department of Zoology, Aligarh Muslim University, 1989, p. 42.
26. Shree MP, Boraiah G. Incidence of Tukra and bacterial blight on mulberry plants in Germplasm Bank. Curr Sci. 1988;57(22):1224-1228.
27. Sriharan TP, Samson MV, Krisnaswami S. Studies on tukra disease of mulberry. Indian J Seric. 1979;18:78.
28. Srinivasan PM, Govindarajan R, Paul AVN. Control of the rose scale *Lindingaspis rossi* (Mask.) by granular insecticides. South Indian Hort. 1974;22(3-4):124.
29. Suresh S. South Indian Coccoidea. Ph.D. Thesis submitted to Tamil Nadu Agricultural University, Coimbatore; 1994.
30. Suresh S, Mohanasundaram M. Coccoid (Coccoidea: Homoptera) fauna of Tamil Nadu, India. J Entomol Res (New Delhi). 1996;20:233-274.
31. Suresh S, Chandrakavitha P. Seasonal incidence of economically important coccid pests of Tamil Nadu. Paper presented at the XI International Symposium on Scale Insects (ISSIS), held at Lisbon, Portugal during, 2007.
32. Vadivelu S, Vasantharaj David B, Rajmohan N. Pests of Crossandra (*Crossandra infundibuliformis*) in South India. Pesticides. 1976;10(12):39-40.
33. Varshney RK. A check list of the scale insects and mealy bugs of South Asia. Part 1. Records of the Zoological Survey of India Occasional Paper. 1992;139:1-152.
34. Varshney RK. A review of Indian coccids (Homoptera: Coccoidea). Oriental Insects. 1985;19:1-101.
35. Williams DJ. A brief account of the hibiscus mealy bugs *Maconellicoccus hirsutus* (Hemiptera: Pseudococcidae), a pest of agriculture and horticulture, with descriptions of two related species from southern Asia. Bull Entomol Res. 1996;86:617-628.
36. Williams DJ. Mealy bugs of Southern Asia. London: The Natural History Museum, 2004, p. 896.