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STUDIES OF INSECT PESTS ON VARIOUS SPECIES OF ORCHIDS IN DIFFERENT DISTRICTS OF MANIPUR

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ABSTRACT

A survey was conducted for the observation of orchid pests in different districts of Manipur. Insect pests species such as aphids (*Macrosiphum luteum*), armored scale (*Furcaspis biformis*) boisduval scale (*Diaspis boisduvalii*), Florida red scale (*Chrysomphalus aonidum*), greenhouse whitefly (*Trialeurodes vaporariorum*), mealybugs (*Pseudococcus jackbeardsleyi*), shoot borer *(Peridaedala* sp.), thrips **(***Dichromothrips nakahari*),weevil (*Sipalinus* sp.), and non-insect pests which include false spider mite (*Tenuipalpus pacificus*), two-striped slug (*Veronicella cubensis*) and snail (*Zonitoides arborus*) were collected and observed. Their mode of damage and diseases caused by them were studied.

INTRODUCTION

Orchids are among the most attractive flowers in uniqueness with incredible forms, blend of hues, size, shapes, fragrance, colour and long flowering period. Dressler (1993) and Cribb *et al*. (2003) stated that Orchidaceae is one of the largest floriculture families with an estimate of more than 25,000 species. In India, Mishra (2007) reported 1331 species in 186 genera, Rao (2007) stated 900 species with 165 genera in NE India and in Manipur Nanda *et al*. (2013) reported 287species in 87 genera. It is recognized as the most important entrepreneur resource (genetic resource, cut flower, potted plant, bouquet, and many other value added products) in the international floriculture trade (Kuehnle, 2007). Orchid diversity generally follows the trends for all epiphytes (Kromer *et al*., 2005). Orchids represent a large portion of global botanical diversity, rank very high in the evolutionary hierarchy of monocots, and are still in an active state of speciation.

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Orchids are, however, victims of their own beauty and utility; the size and frequency of their natural population is declining rapidly because of various reasons like infestation by various insect and non-insect pests *viz*., scale insects, thrips, spring tails, aphids, beetles, ants, wasps, cockroaches, caterpillars, gnats, snails, slugs, mites and nematodes (Pritchard, 1959; Batcherlor, 1982; Leong, 1989). Commercial collection; habitat destruction pressures, *viz.,* deforestation lead scarcity of water, less humidity, increase in temperature, pollution of air and environment etc. has seen to damage orchid germplasm. No reports on orchid pests are observed from Manipur so far. Pest identification and management are of significant importance to orchid conservation and their utilization in commercial industry. With a view to bridge this information gap, studies were conducted to learn different life stages of certain pests, which include damaging stages of different insect pests of orchids. The present paper deals with study of various insect and non-insect pests within different districts of Manipur.

MATERIALS AND METHODS

A survey was conducted in six different districts of Manipur (23°50′-25°42′ N; 92°58′-94°45′ E) *viz.,* Tamenglong

(Dailong, Rangkhung), Imphal East (Jiribam), Senapati (Willong, Oklong, Sadim), Ukhrul (Kamjong), Chandel (Moreh, Sugnu) and Bishnupur (Laimaton) to study the different insect and non insect pest of orchid found in Manipur. The insect-pests with different stages collected during survey were reared in the laboratory for biological studies and observation damaging stages.

RESULTS AND DISCUSSION

Insect pests

Aphid*: Macrosiphum luteum* (Aphididae; Hemiptera)

Yellow aphid has pale green color during nymph stage and greenish yellow to yellow colour in adult stage, oval shaped and about 2-3 mm in length which is similar to the findings of Nagrare (2005). Adults are winged or wingless and wingless forms have a brownish patch on abdomen which are in agreement with earlier report (Meena and Medhi, 2013). Aphids develop piercing and sucking type of mouth parts, secrete honeydew; damaging stage of this insect are both nymphs and adults, they suck the cell sap of the plants. Floral parts of *Dendrobium crepidatum, D. williamsonii, D. nobile, D. chrysotoxum, D. fimbriatum*, *Phaius tankervilleae* and *Liparis viridiflora* were found damaged by this aphid.

Armored scale: *Furcaspis biformis* (Diaspididae; Homoptera)

The armored scale makes a separate protective covering under which the insect lives, feeds, and lays eggs. According to Leonhardt and Sewake (1999), the armored covering is non-living and composed of secreted waxes that cement cast skins together to form the covering. The *Furcaspis biformis* are circular, semi-circular, and oblong and varies in color from white to dark brown. The adult female is always wingless and legless; while the adult male has functional wings. The hatched crawler is mobile and moves about in search of an ideal place to feed. The crawler inserts needle-like mouthpart into the plant and remains there as it develops into an adult. Both nymph and adult damage apical and floral parts by sucking the juice from leaves, petioles, pseudo bulbs, flowers etc. which causes loss of vigor. It does not excrete honeydew. Infested plants become yellowish with spot on leaves, loss of leaves, and even death of the plant. *Fucaspis biformis* found to infect *Cymbidium iridioides* and *cymbidium aloifolium.*

Boisduval scale: *Diaspis boisduvalii* (Diaspididae: Homoptera)

Boisduval scale is one of the most serious scale pests vulnerable to orchids and many ornamental plants. Mature females of boisduval scale is nearly circular and light coloured, usually translucent light tan to creamy white, about 1-2.5 mm long. Immature male scales are easily recognized by their long and narrow protective covering with three row ridges of bright white colour. Maturing male forms a cottony mass. Matured males are small (0.9mm), winged and have orange bodies. *Dendrobium chrysotoxum, D. densiflorum, D. fimbriatum* and *D. aphyllum* are infected by this pest. Both nymph and adult damage the plants by sucking juice from leaves, petioles, pseudo bulbs, flowers and cause loss of vigor and further bring about deformation of infested plants. It secretes honeydew which attracts sooty mould. Plants become yellow, discoloration of infested surfaces, leaf drop and stunted new growth. Johnson (2010) reported that at least 34 natural and hybrid genera of orchids, including popular genera such as *Angraecum, Cymbidium, Stanhopea,* etc. and plants from 17 other families are documented as hosts of Biosduval scale.

Florida red scale: *Chrysomphalus aonidum* (Diaspididae: Homoptera)

Scales are round or moderately shaped dark reddish brown to almost black or ash grayish colour and size is almost 2-2.5mm in diameter. Both nymph and adult damage new shoot, flower bud and leaves of orchids by sucking the juice. As a result, infested plants become stunted growth, losses its vigour and deformation. Meena *et al*. (2011) also reported that *Chrysomphalus aonidum* also secrete visible sticky honey dew which attracts sooty mould and causing fungi. *Chrysomphalus aonidum* was found to infect orchid species *viz*., *Acampe papillosa, Aerides multiflorum, Aerides odorata, Arachnis labrosa, Eria pudica, Gastrochilus calceolaris, Hygrochilus parishii, Papilionanthe teres* and *Vanda motesiana.*

Greenhouse whitefly: *Trialeurodes vaporariorum* (Aleyrodidae: Homoptera)

Fourth-instar nymphs have very long waxy filaments and a marginal fringe. Adults have white wings and a yellow body. All stages feed by sucking plant juices from leaves and excreting excess liquid as drops of honeydew as they feed. Moth like insects attack buds, flowers, new shoot, leaves. Affected leaves become yellowish and later on turn brown. Insect or fly usually attract the lower surfaces of leaves. The plants become stunted in growth with loss of foliage and even become susceptible to viruses which in turn transmit viral diseases to certain vegetables crops. *Trialeurodes vaporariorum* was found to infest *Pholidota alba.* Flink (2002) reported that greenhouse whitefly and silver leaf have a wide host range that includes many weeds, crops and ornamentals.

Mealybugs: *Pseudococcus jackbeardsleyi* (Pseudococcidae: Homoptera)

Johnson (2010) stated that mealybugs are serious pest next to scale insects which are probably the most difficult to control pests of orchids. Immature to adult mealybugs measured about 0.4-8.0 mm in body length. They have piercing and sucking mouthparts, both the nymph and adult suck the cell sap, stem, leaves, petioles and jointed portion of plants. Plants become weak, stunted or shriveled. It also secretes honey dew that attracts ants and also promote development of lead sooty moulds. The infested plant parts lose their natural colour and vigour. Leonhardt and Sewake (1999) stated that mealybugs were also found on roots and are a major cause of quarantine rejections for exported potted orchids. This pest was found to damage *Papilionanthe teres*.

Shoot borer: *Peridaedala sp.,* (Tortricidae: Lepidoptera)

Young larvae are 6-8 mm in size, yellowish or creamy in colour, tiny black head and have powerful jaw.

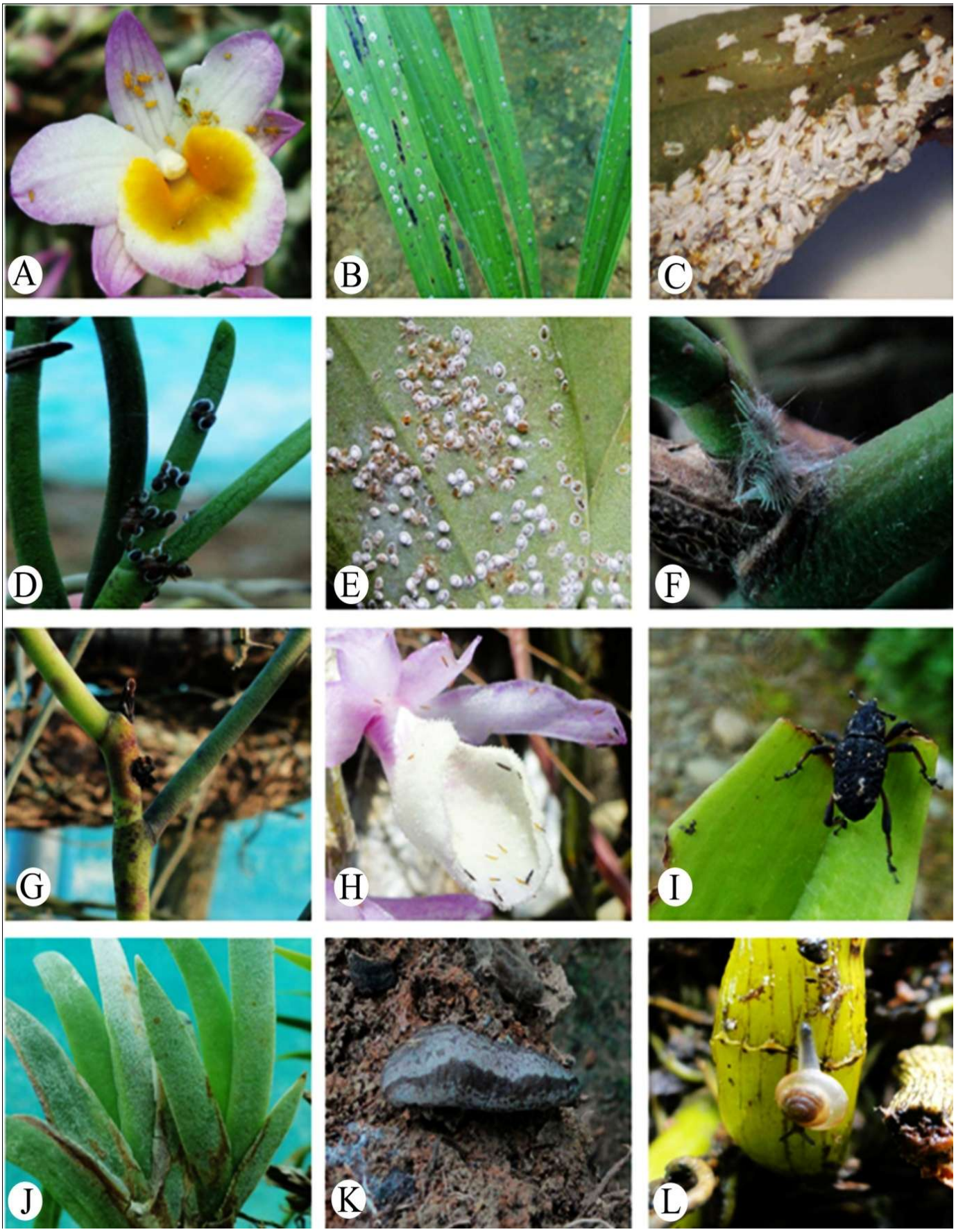

Figure 1. (A) Aphids (*Macrosiphum luteum*), **(B)** Armored scale (*Furcaspis biformis*), **(C)** Biosduval scale (*Diaspis boisduvali*), **(D)** Florida red scale (*Chrysomphalus aonidum*), **(E)** Greenhouse whitefly (*Trialeurodes vaporariorum*), **(F)** Mealybugs (*Pseudococcus jackbeardsleyi*), **(G)** Shoot borer (*Peridaedala* sp.), **(H)** Thrips (*Dichromothrips nakahari*), **(I)** Weevil (*Sipalinus* sp.), **(J)** False spider mite (*Tenuipalpus pacificus*), **(K)** Two-striped slug (*Veronicella cubensis*) and **(L)** Snail (*Zonitoides arborus*)

The young larvae bore holes, make tunnel and feed therein by leaving excreta at opening hole. Infected plants turn yellow to brown with stunted growth and even lead plants to death. Nagrare (2005) reported infestation of 16 species of *Dendrobium* by shoot borer. Meena and Medhi (2013) also reported about 24 species, under 14 genera of orchids to be susceptible to shoot borer. Mao (2012) also reported that the larva bore through the actively growing tips of the stem and kills the plants especially in *Vandaceous, Phalaenopsis* and *Dendrobium,* etc. In addition, shoot borers were also observed in *Papilionanthe teres*.

Thrip: *Dichromothrips nakahari* (Thripidae: Thysanoptera)

Adults are slender, dark brown to black in colour having apically pointed wings, body measures 1.5-2 mm in length (Meena and Medhi, 2013). Meena *et al*. (2011) also reported that nymphs resemble the adult in shape but pale yellow in colour, wingless and smaller in size with black eyes. Both the nymph and adult suck the cell sap of flower buds of *Bulbophyllum careyanum*, *Dendrobium chrysotoxum, D. crepidatum, D. fimbriatum, D. jenkensi* and *D. primulinium*. The infested flowers become curled, wrinkled discoloured at the margins and eventually dries.

Weevil: *Sipalinus sp.,* (Curculionidae: Coleoptera)

Weevils are small, hard-shelled and beetle-like insects with long snouts adapted for boring, body measures about 13-15 mm in length, black in colour and have elytra with yellow spots. The grub is creamy white, newly hatch larvae feed on internal plant tissues and thereafter feed on pseudobulbs resulting to rotting of pseudobulbs. Adult weevils also cause serious damage by boring holes into the growing new shoots, buds and leaves of *Dendrobium primulinium*. Exudates come out from the puncture on which, fungus grow. Meena *et al.,* (2010) reported the occurrence of black weevil as a pest of *cymbidium* sp.

Non-insect pests

False spider mite: *Tenuipalpus pacificus* Baker **(**Tenuipalpidae: Acari)

False spider mites are known as flat mites because most species are dorsoventrally flattened. They are slow-moving and are usually found on the upper & lower surface of the leaves near the midrib or veins. Flat ones are smaller in size, measuring about 0.3-0.4 mm in length, with four pair of legs. They are pale yellowish-green to orange-red in color and often two or more black areas visible through their integument. Flat ones do not spin web. All stages i.e. larva, nymph, and adult feed on *Dendrobium brymerianium* and *Oberonia jenkinsii* by sucking the cell sap of both sides of leaf surface. Plant injury is characterized by stippling, a silverish or bleached appearance resulting from mites sucking on plant sap and chlorophyll with their needle like mouthparts and turns to brown and black (Leonhardt and Sewake, 1999). This damage generally reduces the vigor of plants and may kill plants. Mites may also transmit certain viruses and on heavy feeding produces a patchy chlorotic appearance to leaves and portions of or the entire leaf may turn dry and brown (Johnson, 2008). Two types of orchids (*Grammatophyllum* and *Dendrobium*) that were generally affected by flat mites were reported from 2 commercial orchid growers in south Florida (Cating *et al.,* 2010).

Two-striped slug: *Veronicella cubensis* (Veronicellidae: Mollusca)

Slugs belong to the animal class Mollusca. Slugs are devoid of shells and measures about 9-10 mm in length. They are nocturnal which hide during day, found hidden in plants and plant debris, especially in moist weather and active at night. They feed on the tender foliage, new buds, leaves, flowers, root tips and cause a lot of damage in *Dendrobium ochreatum, D. primullinum, Pholidota alba* and *Vanda coerulea*. The plant is punctured with ragged holes and a slimy trail is visible where pests have passed. Leonhardt and sewake (1999) had reported that *Veronicella cubensis* (Two-striped slug) destroys *Dendrobium* sp*.,* and many ornamentals, vegetable and landscape plants.

Snail: *Zonitoides arborus* (Zontidae: Mollusca)

Snails are soft bodied Molluscs with a spiral shell. They have small flat foot which is used for creeping. They are nocturnal in habit and measures about 9-10 mm in length. They are mostly active at night, especially in moist weather and hide during daytime in crevices and foot withdrawn into the shell. The Molluscs feed on tender leaves, flower buds, new shoots and roots. Infected species such as *Ascocentrum ampullaceum, Dendrobium crepidatum, D. ochreatum, D. primulinum, Thunia alba* and *Vanda coerulea*. Damaged plant is punctured with ragged holes and a slimy trail is visible where pest have passed. Leonhardt and Sewake (1999) have reported that *Zonitoides arborus* (snail) destroys *Dendrobium* sp*.,* and many vegetable and landscape plants.

Conclusion

From the present studies, it may be concluded that even though orchids are strong and has the ability to withstand various physiological stress conditions, to resist various infesting agents apart from a few pests which it could resist. This high value and fascinating plant need proper care and protection. The best way of protecting orchids is through development of eco-friendly pest-control measures and by convincing the people about the importance of this wealth in the wild.

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REFERENCES

Batcherlor, S. R. 1982. Orchid Culture-13 Pests*,* Part-1. *Am. Orchid Soc. Bull*. 51:237-241

Cating, R. A., Hoy, M. A. and Palmateer, A. J. 2010. Silwet L-77 improves the efficacy of Horticultural oils for control of boisduval scale *Diaspis boisduvalii* (Hemiptera: Diaspididae) and the flat mite *Tenuipalpus pacificus* (Arachnida: Acari: Tenuipalpidae) on orchids. *Florida Entomologist* 93 (1): 100-106.

Cribb, P. J., Kell, S. P., Dixon, K. W. and Barrett, R. L. 2003. *Orchid conservation: a global perpective. In*: Dixon, K. W., Kell, S. P., Barrett, R. L. and Cribb, P. J., eds. Orchid Conservation. *Kota Kinabalu, Sabah, Natural History Publications*, pp. 1-24.

Dressler, R. 1993. *Phylogeny and classification of the orchid family*. Cambridge University Press, Cambridge.

Flink, M. L. 2002. Pests in Gardens and Landscapes. Oakland: *Univ. Calif. Agric. Nat. Res. Publ.* 7401.

Johnson, P. J. 2008.*Mites on cultivated orchids* http://nathist.sdstate.edu/orchids/Pests/mites.hmt.

Johnson, P.J. 2010. Biosduval scale on orchids. *Orchid Digest* 74(3): 170-177.

Johnson, P.J. 2010. Mealybugs on orchids. *American orchid society at Fairchild Tropical Botanic Garden*/10901 Old cutler Road / Gables, FL 33156.

Kromer, T., Kessler, M., Gradstein, S. R. and Acebey, A. 2005. Diversity patterns of vascular epiphytes along an elevational gradient in the Andes. *J. Biogeogr*. 32: 1799-1809.

Kuehnle, A. R. 2007. *Orchids, Dendrobium*. P.539-560. *In*: Anderson, N. O, ed. Flower Breeding and Genetics, Springer, 848 pp

Leonhardt, K. and Sewake, K. 1999. Growing *Dendrobium* orchids in Hawaii. Production & Pest Management guide, Hawaii

Leong, A. C. 1989. What is wrong with my orchid plant? *Malayan Orchid Rev.* 23: 28-37.

Mao, A. A. 2012. Orchid stem borer: The silent killer pest. *Newsletter Orchid Soc.India*, 27-28: 24-25.

Meena, N. K., Medhi, R. P., Pant, Rampal R. P. and Barman, D. 2010. *Pest Management in Orchids*. National Research Centre for Orchids, Pakyong, Sikkim, 19 pp.

Meena, N. K., Nagrare, V. S. and Medhi, R. P. 2011. Thrips, *Dichromothrips nakahari* Mound (Thysanoptera: Thripidae) infesting the orchids in India-A new report. *Indian J. Hort*., 68(4):587-588.

Meena, N. K. and Medhi, R. P. 2013. *Pest's Scenario on Orchids and Their Management*. National Dialogue on Orchid Conservation & Sustainable Development for Community Livelihood Pakyong, Sikkim, 72-78 pp.

Misra, S. 2007. *Orchids of India- A glimpse*. Bishen Singh, Mahendra Pal Singh, Dehradun.

Nanda, Y., Sharma, H. B., Rao, A. N. and Vij, S. P. 2013. Contributions to the orchid flora of Manipur (India)-1, *Pleione* 7 (2): 560-566.

Ngarare, V. S. 2005. New record of shoot borer, *Peridaedala* sp. (Lepidoptera: Tortricidae) and its host range of orchids, *Entomology* 30 (4): 359-360.

Pritchard, A. E. 1959. *Orchid pests and their control*. *In*: The Orchids – A Scientific Survey. (Withner, C.L. ed.). John Wiley and Sons, New York, pp. 648 pp.

Rao, A. N. 2007. Orchid Flora of North East India-An Upto Date Analysis. *Bull. Arunachal Forst. Res.* 23(1&2): 6-38.

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