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A review on sucking pest complex of avocado (*Persea americana* Mill.), Lauraceae

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Abstract
Internationally, avocado orchards were relatively free from serious insect pests, until late in the 1980s as a consequence of good control by natural enemies. From three lesion-causing pests in 1982, the insect-pest complex has increased to nine insect pests in 1990. Until the 1990s, when avocado thrips and persea mite were inadvertently introduced into California, invertebrates had caused only occasional problems in mature avocado orchards. During 1989, outbreaks of thrips in avocado resulted in a loss of up to 80% of fruits for some growers and in 1997 orchards heavily infested with avocado thrips, experienced 50-80% crop damage. Introduction of new pests are continually being found in avocado and more can be expected as avocado cultivation, which is relatively young in many parts of the world, becomes older and more widely established. In order to fix the priorities and for evolving suitable pest management strategies, continuous review of the pest complex of avocado under agro climatic conditions is need of the day which has not been carried systematically so far. This manuscript is aimed to present a literature review on the various sucking pests attacking avocado over the world.

Keywords: Sucking pests, avocado, avocado thrips, persea mite

Introduction
Avocado (*Persea americana* Mill.) belonging to family Lauraceae, consisting of 50 genera and 3000 species [1] is regarded as a crop of the new world. It is cultivated widely in Mexico, South America, Australia, and South Africa, from where it was distributed to various parts of the world including India [2, 3]. They are believed to be originated along the Eastern and Central Mexican highlands extending from Guatemala to Central America [4, 5]. The present name avocado has been a modification of Spanish name, aguacate or ahuacate. The fruit has become immensely popular around the world and according to the United Nations Food and Agriculture Organisation [6], the estimated total world production for avocados in 2018 was 6.40 million metric tonnes. Mexico is the largest producer; it accounted for 33.2% (an estimated 1.14 million tons) of global production and 27.6% of the export market in 2004 [7].
On an international level, until late in the 1980s, avocado orchards were comparatively free from serious insect pests, because of good control by natural enemies [8]. The insect-pest complex in avocado has increased from three lesion-causing pests in 1982 [9] to nine insect pests in 1990 [10]. During 1989, outbreaks of thrips [*Heliothrips haemorrhoidalis* Bouché and *Selenothrips rubrocinctus* (Giard)] resulted in a loss of up to 80% of fruits for some growers as reported by Dennill and Erasmus (1991). Damage to avocado fruit, by the various insect pests, have been described and illustrated [8, 9, 11-19].
The main insect pests for avocado are, sucking insects; fruit, seed, and branch borers; and some defoliating caterpillars [20]. Avocado thrips and persea mite are reported as key pests [21] as they often cause substantial economic losses and they are not controlled well by natural enemies. Fruit quality is degraded when avocado skins are scarred by thrips feeding on fruits. Trees are severely stressed and subject to sunburn and potential yield reductions occur due to premature yield drop caused by persea mite. Many potential pests are grouped as secondary and occasional pests because they are suppressed by natural enemies and rarely cause economic damage in avocado. Secondary outbreaks occurs usually when their natural enemies have been killed or disrupted due to various reasons. Avocado brown mite, greenhouse thrips and six spotted mites are some of the sucking pests with secondary pest status. Mealybugs, scale insects and whiteflies are especially well controlled by parasites and predators except when this biological balance is disrupted [21].

In 1997, orchards in Ventura County which were heavily infested with avocado thrips, *Scirtothrips perseae* (Thysanoptera: Thripidae) [22] experienced 50 to 80% crop damage and fruit that suffered feeding damage was either unmarketable or downgraded in packinghouses [23, 24]. In 1998, from the combined effects of losses in quality and increased production costs associated with *S. perseae* management, crop losses were estimated at $7.6–$13.4 million (US) [25]. By May 1998, *S. perseae* infested 80% of California avocado orchards [26] and currently ~95% of fruit-bearing orchards are reported to have this pest.

Important pests of avocado like greenhouse thrips, *Heliothrips haemorrhoidalis* (Bouché) (Thysanoptera: Thripidae), avocado brown mite, *Oligonychus punicae* (Hirst) (Acari: Tetranychidae), six-spotted mite, *Eotetranychus sexmaculatm* (Riley) (Acari: Tetranychidae), and omnivorous looper, *Sabulodes aegrotata* (Guenée) (Lepidoptera: Tortricidae), *Amorbia cuneana* (Walsingham) (Lepidoptera: Tortricidae) have been kept below economically injurious levels by natural enemies [27, 28, 29].

New sucking pests are continually being found infesting the avocado and more can be expected as avocado cultivation, which is relatively young in many parts of the world, becomes older and more widely established. For example, in 1982, a sucking pest red-banded whitefly, *Tetraleurodes perseae* Nakahara (Hemiptera: Aleyrodidae), was established in San Diego County [30, 31, 32, 33]. Following red-banded whitefly, persea mite, *Oligonychus perseae* Turtle, Baker and Abbatiello (Acari: Tetranychidae), was discovered attacking avocados in San Diego in 1990 [34]. In 1996, avocado thrips, *Scirtothrips perseae* Nakahara (Thysanoptera: Thripidae), was discovered almost simultaneously in orchards 160 km apart in Ventura and Irvine Counties [23]. This shows that over a period of approximately 14 years (1982-1996), three new sucking pests established in avocado, which has an establishment rate of a new pest around every seven years.

Neohydatothrips burungae, a thrips species closely resembling avocado thrips was seen in avocado leaves in Mexico and Guatemala [35]. New pests may attack avocado from other fruit crops or from native vegetation, or they may be accidentally introduced from other avocado-growing areas. Despite serious sporadic and localized attacks on certain varieties the pests of avocado, however, have not yet attained the same relative importance when compared to the principal pests of other subtropical fruit crops. This fortunate situation is believed to be due to the fact that the principal avocado pests are hindered from attaining their maximum potentialities as pests either by adverse climatic conditions, or by effective biological control.

In order to fix the priorities and for evolving suitable pest management strategies, continuous review of the pest complex of avocado under agro climatic conditions is need of the day which has not been carried out methodically so far. Considering the growing want in plant protection, it is crucial to devise an effective pest management tactics. The present review could help farmers to align the avocado production with the changing conditions and demand of time. The aim of this article is to stress awareness of the sucking pest complex which can be found in avocado orchards.

Insect pests of Avocado

1. Thrips

The most important sucking pests of avocado are thrips [36]. Thrips are sucking pests that damage epidermal cells and remove the cellular content from various plant tissues [37]. Consequently, necrotic areas appears on the fruits and they cause scars and the fruit becomes unmarketable [38]. When thrips feed on very young avocado fruits they can cause malformation and early fruit drop [39]. In California, infestation by *Scirtothrips perseae* Nakahara in avocado orchards causes economic losses of 7.6–13.4 million USD every year as reported by [40].

The following six genera were identified: *Scirtothrips*, *Neohydatothrips* (Sericothripini), *Frankliniella* (Thripini), *Leptothrips* (Dendrothripini), *Arorathrips* (Chirothripini) and *Caliothrips* (subfamilily Panchaetothripinae). Except for the genus *Frankliniella*, each genus contained only one species. The most abundant specimens were those within the genera *Scirtothrips* and *Frankliniella*. Within each genus the following species were identified: *Scirtothrips perseae*, *Neohydatothrips signifer* Priesner, *Arorathrips mexicanus* Priesner, *Caliothrips marginipennis* Hood. Only one predatory species was found: *Leptothrips mcconnelli* (Crawford). Six species found in the *Frankliniella* genus were: *F. occidentalis* (Pergande), *F. gardeniae* (Moulton), *F. borinquen* (Hood), *F. brunnea* (Priesner), *F. rostrata* (Priesner) and *F. insularis* (Franklin) [41]. Some reports suggested that more than 80 species of thrips can be found on avocado in Mexico, mainly from the genera *Scirtothrips*, *Neohydatothrips* and *Frankliniella* [39].

A. Avocado thrips

Avocado thrips, *Scirtothrips perseae* (Thysanoptera: Thripidae) [22] is a new pest of major economic significance reported in avocado orchards of California [42]. In the home range of *S. perseae*, this pest is found feeding on avocados at elevations exceeding 1500 m and it has not been claimed below this elevation [42]. These are small, slender, yellow-colored sucking insects that are primarily found on the undersides of immature leaves and fruit and are about one-sixteenth inch in length. Adults are winged but are poor fliers. Females lay eggs inside immature leaves and fruit about 1 to 2 inches long. Larvae and adults can build up to such high densities on young leaves that subsequent feeding damage can cause premature leaf drop during the spring. The main source of economic loss caused by avocado thrips is scarring of immature fruit in late spring by larvae and adults. Scarring can be severe enough to make the entire fruit surface brown, and a characteristic “alligator skin” appearance results. Fruits that are entirely scarred can continue to grow, and the flesh of the fruit remains healthy green. However, even partial fruit scarring results in downgrading of fruits in packinghouses because of cosmetic damage [35]. Scarring ≥5% of the fruit surface by feeding thrips results in economic loses to growers [43].

When fruits were setting avocado thrips were generally more abundant on young leaves than on fruit from early to mid-June. When leaves aged and hardened from late June through August, equal or higher numbers of thrips were generally found on fruit, although overall numbers of thrips declined during this period with increasing summer temperatures [44]. A total of 95 natural enemies from six genera with known predatory thrips (*Aeolothrips*, *Aleurodothrips* [attacking whitefly and scale], *Franklinothrips*, *Leptothrips*, *Scolothrips* [attacking mite] and *Karnyothrips*), one genus of hymenopterous parasitoid (*Ceranisus*) and a predatory mite (*Balaustium*) were found attacking avocado thrips [42]. In an entomopathogenic bioassay with laboratory-reared avocado

thrips, *Scirtothrips perseae*, it was identified that *Chryseobacterium sp* shows an entomopathogenic effect on avocado thrips survival [45].

Increased dependence and use of pesticides for *S. perseae* control increases the likelihood of resistance development, destruction of beneficial non-target organisms, and environmental contamination. Alternatively, biological control may provide cost-effective and environmentally benevolent long-term control of *S. perseae*, and natural enemies could be integrated with other techniques to control additional avocado pests that will become established in the future [46].

B. Neohydatothrips burungae

Neohydatothrips burungae (Hood) stat. rev. (Thysanoptera: Thripidae: Sericothripinae) a new species closely resembling avocado thrips was discovered in avocado in San Diego County in 2004. *N. burungae* was found in large numbers on avocado leaves in Mexico and Guatemala [42], and that the species breeds on *Medicago sativa*, *Phaseolus vulgaris* and *Solanum esculentum* in Argentina [47]. In areas of intermediate altitude in Mexico and Guatemala this thrips was as common as avocado thrips, *Scirtothrips perseae*. In colder high-altitude areas *S. perseae* dominated, almost exclusively, and in warmer more humid lowland areas *N. burungae* was dominant on avocados [48]. In comparison with avocado thrips, *N. burungae* has dark brown shading on the thorax, darker abdominal stripes, and brown bands that occur only on top of its abdomen, not underneath. The reliable way to distinguish these thrips is according to differences in size and position of setae (stout hairs) on the thorax and wings. *N. burungae* has a continuous row of short, stout hairs on both mid veins within its forewings. On the other hand, avocado thrips has relatively few hairs along these mid veins on its front wings and there are sizable gaps in both of these rows of hairs [28].

C. Common blossom thrips

Common blossom thrips, *Frankliniella schultzei* Trybom, (Thysanoptera: Thripidae) is an anthophilous pest species [49, 50] whose diet is predominantly pollen and floral tissues [51]. Being a polyphagous insect pest, it feeds on flowers of various ornamental crops, vegetable and fruit crops in different parts of the world [49, 51]. *Frankliniella schultzei* on 83 species of plants from 35 families with important hosts being cotton (*Gossypium spp*.), groundnut (*Arachis hypogaea*), beans (*Phaseolus vulgaris*) and pigeon pea (*Cajanus cajan*) and avocado (*Persea americana*) were also reported [52, 53, 54]. In Afrotropical highlands of Taita Hills and Mount Kilimanjaro, *Frankliniella schultzei* is a pest of avocado crop that feeds on floral resources [50, 55] thereby causing flower abortion and subsequent low fruit-set. This pest, therefore, impacts negatively on livelihood of small-scale farmers as it adds to low yield of avocado fruits which the local growers depend on as a source of money and nutritious food.

D. Greenhouse thrips

Greenhouse thrips, *Heliothrips haemorrhoidalis* Bouché (Thysanoptera: Thripidae) are an important pest of avocados in New Zealand [56]. Greenhouse thrips are also reported as pest of avocados in Israel [57], South Africa [18] and California [58]. Larval and adult greenhouse thrips cause collapse of the cell wall and discolouration of the surface of the fruit or leaf due to feeding injury by piercing and sucking out the contents of cells. More than 40 types of plants in New Zealand are reported as hosts for greenhouse thrips and feeding damage is often described as 'silvering' [59]. However, on avocado fruit the damage is more accurately labeled as 'bronzing'. While minor greenhouse thrips damage can be tolerated, any damage covering an area of more than 2 cm^2 will result in the fruit being unacceptable for premium export grade. The greenhouse thrips causes rind blemish problems on developing citrus fruit (i.e., ring spotting or irregular russeting) on immature and mature clustered fruit, or where a leaf or twig is in direct contact with fruit [60].

2. Mites

Eighteen species of mites from 9 families in the suborders Prostigmata and Mesostigmata were found associated with avocado trees in the state of Michoacan. Phytophagous and predatory species, as well as species with unknown feeding habits, were among them. With the exception of the Uropodidae, which were found only on the fruit and trunk, all other families were found on foliage. Cheyletid mites were also found on the trunk and tarsonemid mites on the fruit [61].

A. Persea mite

The Persea Mite, *Oligonychus perseae* Tuttle, Baker and Abbatiello (Acari: Tetranychidae) is native to Central America [62]. It was first described from avocado plants, entering Texas (USA) from Mexico in 1975 and it has since then been reported from Costa Rica [63, 64], USA (California, Florida, Hawaii) [65, 66, 67, 68], Israel [69], Portugal (mainland and Madeira) [70], Spain (mainland and Canary Islands) [71, 72, 73] and Italy [74].

Adult females have an oval-shaped body that is slightly flattened and elongated. Females and immatures are yellowish or greenish with two or more dark food spots on the hysterosoma. Males are pear-shaped, slightly flattened, and yellowish with or without small dark spots; they are smaller than reproductive females. Persea mite has five developmental stages (egg, larva, protonymph, deutonymph, and adult). All life stages are predominantly found in nests where feeding, mating, reproduction, and development occurs. Sex ratio is generally two females to one male [75]. Female longevity and fecundity are significantly influenced by the intrinsic quality of the leaves. The chemical composition of sap and leaves of avocados varies both with time of year and cultivar was reported [76].

Other than avocado, *O. perseae* can infest several weeds, wild, ornamental and fruit plants [62, 34, 65, 67]. The mite develops densely woven nests along midribs and veins on the lower side of leaves and its feeding produce characteristic circular necrotic spots on the leaf surface [67]. High mite densities can cause partial or severe defoliation, especially on the cultivars Hass and Gwen that are the most susceptible ones [76]. Significant impact on leaf damage and on average yield (20% decreases in yield at the infestation rate of 250 mites/leaf) was recorded in Israel [77].

Various species of predators, both generalist insects and mites, occur on avocado in regions where *O. perseae* is known. Among the insects, specialized predatory thrips, brown and green lacewings, midges, and lady beetles are common in the field. Various species of phytoseiid mites, including *Cydnodromus californicus* (McGregor) [78], *Euseius hibisci* (Chant), *E. scutalis* (Athias-Henriot), *Galendromus annectens* (De Leon), and *G. helveolus* (Chant) [79, 80, 81] are reported to feed on persea mite. In California, the native *E.*

hibisci, a predatory mite and pollen feeder, was found throughout the state [82] while *E. scutalis* is well known as the most abundant predatory mite species in Israeli avocado orchards [80].

B. Avocado brown mite

The avocado brown mite, *Oligonychus punicae* (Hirst), (Acari: Tetranychidae) is dark brown, oval, and tiny (about 0.01 inch or 0.3 mm long) and its tiny amber-colored eggs have a short projecting stalk. As mite numbers increases, eggs are increasingly found throughout the upper leaf surface. The species feeds primarily on the upper leaf surface but they also feed on lower leaf surface and fruit, when mite densities are high. Its feeding damage results in bronzing of upper leaf surfaces [61].

C. Six spotted mite

Six-spotted mite, *Eotetranychus sexmaculatus* (Riley), (Acari: Tetranychidae) is remarkably similar in appearance to persea mite and they feed on underside of leaves. Their feeding causes irregular brown to purplish discolouration, mostly along the midrib and larger veins. Six spotted mite produces webbing, but it is not the dense silk patches formed by persea mite. It does not produce circular feeding colonies covered with dense webbing and necrotic spotting is purplish and irregular in appearance [26].

D. Avocado bud mite

Avocado bud mite, *Tegolophus myersi* (Acari: Eriophyidae) is also reported as pest of avocado [21]. Damage by avocado bud mite can include excessive bud abortion, dropping of young fruits and distorted elongated fruit growth.

3. Scale insects

Scale insects are sap-sucking hemipterous insects that include members of the superfamily Coccoidea (Hemiptera) [83]. These insects are usually less than 5 mm in length and their taxonomy is based primarily on the morphological characteristics of the cuticle of the adult female. The adult female is paedomorphic, maturing sexually in a juvenile form, while the adult male (when present), after passing through a prepupal and pupal stage, becomes a winged insect (sometimes with reduced wings) with non-functional mouthparts [83]. There are about 32 families of scale insects and the most common families are those with the most species, namely the Diaspididae and Coccidae [84]. Scale insects can weaken or kill plants by sucking their sap, injecting toxins, transmitting viruses or by excreting honeydew, which serves as a medium for sooty mould [85, 86]. Except virus transmission, all other scale insect damages can be observed in the avocado tree. Scale insects attack fruits they can cause cosmetic damage, or when the sooty mould that grows on the honeydew affects the fruit [87].

Scale insects commonly collected on avocado in Colombia include *Hemiberlesia cyanophylli* (Signoret), *Pseudoparlatoria parlatorioides* (Comstock) (Diaspididae), *Ceroplastes rubens* Maskell, *Coccus hesperidum* L., *Protopulvinaria pyriformis* (Cockerell), *Pulvinaria psidii* Maskell and *Saissetia neglecta* De Lotto (Coccidae). Twenty-two species of scale insect are new records on avocado for Colombia of which nine species are new records worldwide, namely, *Lindingaspis rossi* (Maskell), *Pseudischnaspis bowreyi* (Cockerell) (Diaspididae), *Pulvinaria psidii* Maskell, *Saissetia neglecta* De Lotto (Coccidae), *Ferrisia kondoi* Kaydan and Gullan, *Pseudococcus jackbeardsleyi* Gimpel and Miller, *P. landoi* (Balachowsky) (Pseudococcidae), *Eurhizococcus colombianus* Jakubski (Margarodidae) and *Austrotachardiella colombiana* Kondo and Gullan (Kerriidae) [87].

A. Armored scale insect

The armored scale insect *Hemiberlesia lataniae* (Signoret) (Hemiptera: Diaspididae), commonly known as latania scale, was once a significant problem on avocados, in California. However, after the introduction of several parasitoid species in the 1940s to combat California red scale, *Aonidiella aurantii* (Maskell), on citrus [88], the abundance of latania scale was reduced, apparently as a fortuitous result of excellent coincidental biological control by one or more of these introduced parasitoids [89]. As a result today, armored scale insects are no more than an occasional and very minor pest of avocados in California [90].

Gerson and Zor (1973) provided a key to seven species of armored scales (in six genera) on avocados in Israel and explained their biology, population trends and spatial distribution on the plant. *Hemiberlesia lataniae* (Signoret) and *Abgrallaspis cyanophylli* (Signoret) are the most abundant. Avocado seedlings become infested in the nurseries, thus serving as important sources for commercial orchard contamination. Equal-area examinations of bark and leaf revealed that *H. lataniae* prefers the bark and *A. cyanophylli* prefers the leaves. Several predators and hymenopterous parasitoids attack the diaspidids and the parasitoids are most active in early summer. But no economic injury to local avocado fruit by armoured scale insects has been reported in recent years [91].

The most frequently intercepted armored scale in avocado shipments inspected in Florida is latania scale, *Hemiberlesia lataniae* (Signoret) (Hemiptera: Diaspididae) (62% of interception records). It is a highly polyphagous species and in Florida, it is an occasional pest unless it is suppressed by one of several species of parasitoid wasps [92].

Aguacatae scale, *Davidsonaspis aguacatae* (Evans, Watson & Miller) (Hemiptera: Diaspididae) was described in the genus *Abgrallaspis* Balachowsky based on specimens infesting imported avocados [93], but later it was transferred to *Davidsonaspis* [94]. Aguacatae scale, which may co-occur with latania scale on the same fruit, accounts for 25% of interception records [92].

4. Mealybugs

Mealybugs (Hemiptera: Pseudococcidae) are small, soft-bodied plant sucking insects that constitute the second largest family of Hemiptera: Coccoidea, with more than 2,000 described species [95, 96]. Their common name is derived from the mealy wax secretion that usually covers their bodies [97]. The long-tailed mealybug, *Pseudococcus longispinus* (TT) and the striped mealybug, *Ferrisia virgata* (Cockerell), can be found on fruit and fruit stalks [8].

A. Long-tailed mealybug

The long-tailed mealybug, *Pseudococcus longispinus* (TT), (Hemiptera: Pseudococcidae) causes damage either directly by sucking the plant sap or indirectly by excreting honeydew on which sooty mould develops. Heavy infestation of the fruit and its stalk is expected to retard its development and to cause shrinkage or fruit drop. The sooty mould interferes with the physiological processes of the tree and lowers the quality of

fruits. Moreover, the honeydew attracts the honeydew moth, *Cryptoblabes gnidiella* Mill., the larvae of which gnaw the fruit [98]. In 1952 there was a population outbreak in the citrus orchards of Miqwe Yisrael [99, 100], and in the 1970s in the Kadima-Even Yehuda district [101].

As a result of good biological control, these mealybugs are present on avocado fruit only when the natural balance has been disrupted. Prinsloo (1983) lists the following parasitoids for the long-tailed mealybug: *Gyranusiodea litura* Prinsloo, *Leptomastix sp* and *Tetracnemoidea sp*.[102].

B. Striped mealybug

The striped mealybug, *Ferrisia virgata* (Cockerell), (Hemiptera: Pseudococcidae), are reported to be found on fruit and fruit stalks [8]. Prinsloo (1983) lists the following parasitoids for the striped mealybug: *Aenasius advena* Compere, *Anagyrus subproximus* (Silvestri), *Anagyrus sp*, *Blepyrus insularis* (Cameron), *Gyranusoidea citrina* (Compere), *Leptomastidea abnormis* (Girault), *Leptomastix bifasciata* Compere, *L. longipennis* Mercet and *Pseudaphycus ferrisianae* Bennett and the hyperparasitoid *Prochiloneurus aegyptiacus* (Mercet) [102]. As ants protect them from predators and parasites, mealy bugs tend to be serious pests in the presence of ants. These may be controlled by the release of lady bird beetle, *Cryptolaemus montrouzieri* at 10 beetles/tree after fruit set [103].

5. Whiteflies

García-Palacios *et al*., (2020) reported three species of whiteflies associated with avocado. *Tetraleurodes perseae* Nakahara, *Paraleyrodes minei* Iaccarino, and *Trialeurodes vaporariorum* (Westwood) (Hemiptera: Aleyrodidae) were identified [104]. The first two were collected on avocado trees, and the third was found in weeds associated with an avocado orchard.

A. Red-banded whitefly

The red-banded whitefly, *Tetraleurodes perseae* Nakahara [31], was first discovered in San Diego in 1982 [32, 33] and was described in 1995. This whitefly is probably native to Latin America and specimens are known to be from the Caribbean, Central America, Florida, and Mexico [31]. Although their presence and damages they cause can decrease vigor and affect production, red banded whiteflies are considered secondary pests for avocado crops since they show up only occasionally [105].

Adult females of red-banded whiteflies lay kidney bean shaped eggs on undersides of leaves. Upon hatching, the light brown colored first instar nymph walks a short distance from the egg and settles and commences feeding. All of the subsequent immature whitefly stages are sessile and do not move from the original feeding site selected by the crawler. As whitefly nymphs mature, they shed their cuticles before moving onto the next developmental stage. The unofficial common name for *Tetraleaurodes perseae*, red-banded whitefly, is because of the rusty red bands on the wings of adults [106].

Red-banded whiteflies are under very good control in Mexico by two *Encarsia spp*. and one *Eretmocerus sp*. of parasitoids (both Hymenoptera: Aphelinidae). In California, these Mexican parasitoids are absent, but *Cales noacki* Howard, a parasitoid released for woolly whitefly (*Aleurothrixus floccosus* [Maskell]) control can parasitize up to 92% of red-banded whitefly nymphs in some coastal areas [32, 33].

Conclusion

Due to increasing health consciousness among the educated population and the high nutritive value of avocado, it finds its rightful place in the market. The successful introduction of avocado in household nutrition security can turn avocado as a potential fruit crop. Having more nutrition than any other fruit in the New World, it is considered to be the most important contribution to human diet. As an upcoming crop with lot of nutritional, environmental, social and economic benefits, it's high time that we conserve the natural enemies and at the same time be aware of the sucking pests of avocado that can gain a major pest status in due course.

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