



Review Article

FALSE CHINCH BUG-AN EMERGING THREAT TO AGRICULTURAL CROPS

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Abstract: *Nysius* is a genus of false chinch bugs in the family Lygaeidae. False chinch bug (FCB), *Nysius* sp. (Hemiptera: Lygaeidae) is a highly polyphagous and occasional pest in the world, where it may become an emerging pest. Their capabilities to give rise to outbreaks, mainly during warm and dry periods, make the insect a major pest in a number of countries. It has a smaller size with greyish-brown coloration and transparent wings. FCB has incomplete metamorphosis. It causes damage by using piercing-sucking mouthparts; both nymph and adult of FCB puncture stems, foliage, and fruits then sucking cell sap from it. FCB causes an average of 10-90 % seed yield loss in agricultural crops. For management purposes cultural practices viz., use of resistant cultivars, deep ploughing, sprinkler irrigation, and removal of alternate weed hosts should be adopted; mechanical practices viz., boll weevil traps with mustard oil compounds, yellow sticky trap, and blue sticky trap are used; physical control by using low radio frequency level. Predators like, big-eyed bugs, lynx spiders, jumping spiders, sphecids, chrysids, birds, and parasitoids like *Telenomus ovivorus*, *Phasia occidentis* are used for biological control to mitigate infestations in the field. And the chemicals like thiamethoxam, profenophos, cypermethrin, Spinosad, Lambda-cyhalothrin, imidacloprid caused significant FCB mortality.

Keywords: False chinch bug, Life cycle, Seasonal incidence, Nature of damage

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Introduction

False chinch bug (FCB), *Nysius* sp. (Hemiptera: Lygaeidae) is a belongs to genus *Nysius*, which is complex and large genus with more than 100 species described from the world [1] and 7 from India [2]. It is highly polyphagous and occasional pest. Five species reported from India viz., *N. minor*, *N. inconspicuus*, *N. ericae*, *N. laucustricus*, *N. ceylanicus*. The species of the genus *Nysius* are uniorbivoltine [3], but some have been found to reach a third generation within the same year [4]. It is also called as wheat bug, *N. huttoni* [5]; canola bug, *N. cymoides* [6]; perilla seed bug, *N. plebeius* [7]; grey cluster bug, *N. clevelandensis* [8]; rutherghlen bug, *N. vinitor* [8]; dusky bug, *N. inconspicuus* [9]. *Nysius* species are reported from various countries and have been found in all the continents of the world except Antarctica, and in most island groups except south eastern Polynesia. Its damage was found on crops belongs to different families. It has incomplete metamorphosis. Outbreaks of FCB have been recorded on several crops, particularly in seasons of high temperature with warm and dry periods.

Difference between false chinch bug & true chinch bug

False chinch bug can be distinguished by its smaller size, greyish brown coloration and transparent wings, as compared to the larger black bodies and white wings of the true chinch bugs [10].

Occurrence and Distribution

Different species are reported from various countries and have been found in all the continents of the world except Antarctica, and in most island groups except south-eastern Polynesia. In India, *Nysius* sp. Reported in Andhra Pradesh, Himachal Pradesh, Chhattisgarh, West Bengal, Uttar Pradesh, Uttarakhand, Jharkhand, Sikkim, Rajasthan and Gujarat [11]. In Gujarat, its incidence was reported on muskmelon [12].

Host range

Its damage was found on crops belongs to different families especially Asteraceae along with Brassicaceae, Chenopodiaceae, Fabaceae, Asteraceae, solanaceae, Amaranthaceae, Poaceae [13].

Marks of identification

Egg

Adult female lay concave ventrally, convex dorsally and laterally [14], 12-22 creamy white or pinkish hue eggs about 0.77-1.5 mm long, 0.4-0.28 mm wide in soil and on the host, plant parts such as seeds, flowering heads, leave and stems in group or singly which later turns deep orange during hatching.

Nymph

Nymphs are characterized by presence of wing bud. A nymph is oval or pear shaped about 0.7 mm long and 0.3 mm wide and reddish – orange, but later instars brownish grey or dark brown with yellow-pinkish with reddish - orange markings [15]. In Lygaeidae species usually have five instars [16]. But in some *Nysius* sp. either four to six instars or two to four instars. High temperature and long day length cause frequent five or six instars whereas; low temperature and short-day length result in four instars [17].

Adult

Adult are small to medium insects, 2.4 – 4.5 mm long. Adults have various body forms on the basis of wing development, called wing polymorphism. Larger individuals have only macropterous forms, which are predominant in field conditions (94.1%), whereas the medium and smaller individuals show the three different forms viz., macropterous, brachypterous and sub brachypterous.

Life cycle

False chinch bug has incomplete metamorphosis and different species having variable life span required for identification [18]. The female of FCB laid 11.62 eggs in captivity [19]. The average incubation period was about 5 days and nymphal duration was about 20 days. The adults survived for 14-15 days whereas, the total life span was 40 days.

Favorable condition

Outbreaks causes in warm, dry conditions were reported for *N. raphanus* and *N. huttoni* two common pest species in North America and New Zealand, respectively [20,21]. For *N. cymoides* linear model derived from laboratory studies and report minimum thresholds of 13.6°C and more than 15°C for eggs and immature stages respectively, with developments being faster when temperatures increase from 17.5°C to 37.5°C. *Nysius natalensis* enjoys favourable development in temperatures ranging from 26°C to 36°C, with development becoming stronger as temperature increases [22] and *N. vinitor* and *N. groenlandicus*, which have a thermal preference of at least 30°C, are tolerant of high temperatures and desiccation [23].

Nature of damage

False chinch bug feed on plants by using their piercing and sucking mouth parts which cause damage to the plant, fruit tissues as well as wilting and necrosis of tissues. Heavily attacked seed pods produce non-viable seeds and yield and quality are affected. When large aggregations occur on plants, feeding damage can result in wilting, curling; die back of plant and death of leaves, particularly newer growth [24].

Management

Cultural control

Cultural practices like, summer deep ploughing, sprinkler irrigation and removal of alternate weed hosts should be adopted. Wheat cultivars Domino and Oroua consistently showed less susceptibility to bug attack [25] whereas, the canola cultivars Hayula 401 and RGS were resistant cultivars to *N. cymoides* [26] and Regal and Corka was less susceptible cultivars of kale crop and they suggested growing these cultivars. Crops like, alyssum and wheat were the most preferred host for FCB feeding and they suggested growing alyssum and wheat as trap crop in IPM strategy to manage this pest.

Mechanical control

For the mechanical control of FCB, mustard oils have been recorded as attracting FCB, the major attractive compound in ethyl methyl ICB mixture was ethyl ICB [27] and the yellow trap was the most attractive color to FCB, and the blue trap was the second. The blue trap was also the most attractive color to the tachinid parasitoid of FCB, and they also revealed that both species showed attraction to crude extracts of oilseed canola and mustard [28] and furthermore, the rate of females' response to 10 µg of ETCB was greater than the males, so the effect of ETCB was found stronger in females than males [29].

Physical control

Low radio frequency levels had the greatest effect on the life-table parameters of *Nysius* species, with the lowest rate of adult emergence and the shortest adult longevity at 5 kHz [30].

Biological control

In biological control, insectivorous birds play role to manage this pest. The egg parasite *Alophora lepidofera* found effective to control FCB. The incidence of parasitism by *Alophora lepidofera* of females of FCB ranged from 10.5 to 61.7 per cent for *N. vinitor* and from 13 to 60.9 per cent for *N. clevelandensis*. Species of genus *Geocoris* Fallen (Hemiptera: Geocoridae), may prove to be an asset in *Nysius* control. Some lynx spiders (Araneae: Oxyopidae) and jumping spider's prey on *N. vinitor* and *N. natalensis* [31]. The fungus *Beauveria bassiana* seems to be use for management of *N. vinitor*, as well as other lygaeids [32].

Records of egg parasitoids on FCB are, *Telenomus ovivorus*, which developed at the expense of *N. raphanus* eggs [33]. Additionally, egg as well as nymphal parasite from tachinids (Diptera: Tachinidae) of the genus *Phasia Latreille*, *Phasia occidentis* parasitize some *Nysius* species [34]. *Solierella peckhami* is nymphal parasitoid of *N. raphanus* [35].

Chemical control

The bio efficacy of different insecticides evaluated by different scientists. Chlorpyrifos, dichlorvos, endosulfan and methomyl are insecticides with a contact action, they were as effective and cause mortality of FCB as the systemic insecticides [36] and sprays of permethrin. This reduction resulted in a 25–79 % increase in yields compared with untreated bags [37]. Furthermore, diazinon and chlorpyrifos were significantly more effective insecticides than other insecticides. In the second year, permethrin, thiamethoxam, endosulfan and chlorpyrifos were the most effects insecticides for causing on FCB mortality at 24h, while an enfenvaterate, lambda-cyhalothrin and imidacloprid were fewer effective insecticides [38]. And in some experiments, chlorpyrifos resulted in the lowest LC₅₀ and highest mortality in both years and cyfluthrin and lambda – cyhalothrin resulted in moderate efficacy insecticides. However, Permethrin showed the lower LC₅₀ and higher mortality than lambda – cyhalothrin and esfenvaterate in the following year [39-44].

Conclusion

The false chinch bug is highly polyphagous and occasional pest in the world, where it may become an emerging pest. Their capabilities to give rise out breaks, mainly during warm and dry periods, make the insect a major pest in a number of countries.

Future thrust

False chinch bug is emerging pest of agricultural crops and cause significant economic losses to the crop and crop produces so that for the effective control of FCB it is very important to conduct survey on various crops; need to study the effect of climate change on the behaviour of FCB and evaluate the different botanicals or plant extracts against FCB. Furthermore, need to evaluated bio-efficacy of newer insecticides against FCB of various important crops.

Application of research: The FCB can be managed by integrating various management practices viz., cultural (deep ploughing, removal of weed hosts, trap crop, less susceptible cultivars); mechanical (yellow sticky trap and different attractants); physical (radiofrequency); biological (predators and parasitoids) and chemical (chlorpyrifos and thiamethoxam).

Research Category: Agriculture Entomology

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