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Whitegrub *(Brahmina coriacea)*: A Potential Threat to Potato

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The problem of whitegrubs is quite serious in entire northwestern Himalaya, where the potatoes are grown during summer season as rainfed crop under long day conditions. The tuber damage often exceeds 50 per cent in endemic areas. This article discusses shortly about its biology and management.

Introduction

Whitegrubs are regular pest of potato in higher hills of Himachal Pradesh. The problem of whitegrubs is quite serious in entire northwestern Himalaya, where the potatoes are grown during summer season as rainfed crop under long day conditions. The *B. coriacea* grubs appeared in epidemic form in potato in Shimla hills of Himachal Pradesh during 1980's. Recognizing the potential impact of *B. coriacea*on potato production, the then Director of Agriculture, Himachal Pradesh attracted the attention of State Agricultural University towards the increasing problem of whitegrubs in 1984 (Chandel *et al.* 2010).

In potato, the tuber damage often exceeds 50 per cent in endemic areas. In forest nurseries up to 30 per cent infestation due to grubs of *B. coriacea* has been reported in mid hills of Himachal Pradesh (Chandel, 1992). Due to large scale deforestation, the beetles have moved into areas near the agriculture fields for feeding on shrubs/fruit trees and have resulted in egg laying in the cultivated areas and thus becoming pest of crops (Mehta *et al.* 2010).

Biology and Life Cycle

Female beetles deposited eggs inside the soil up to a depth of about 8 cm. female beetle lay up to 190. The eggs were deposited in small earthen cells. There was one egg in each cell. Cells were present at a depth of 4-8 cm and provided enough space around the eggs. There was sufficient space between the two egg cells inside the soil. Eggs were shiny milky.

Milky white eggs of *B. coriacea*

The incubation period ranged from 6-8 days. During this final instar the grub turned slightly yellowish to creamish white in color, but the color of head capsule remained dark brown.

First instar

Second instar

Third instar

Different instar grubs of *B. coriacea*

The full fed third instar grubs stopped feeding and formed earthen cells. . Total larval period ranged from 202-279 days *B. coriacea*. Pupawas without any cocoon inside the hard earthen cell. The cuticle of last larval instar was pushed to its posterior end. The pupae were creamish yellow in colour. In *B. coriacea*, the pupae are of exarateadecticious type (Chandel*et al*. 1995). The head and legs in freshly ecdysed beetles were brown, but elytra were very soft, creamy white to yellowish which later on darkened to brown after about one day. After about one week, the beetles turned black in colour. The male beetles were slightly smaller than the female beetles. The overall survival of female beetles was quite longer as compared to males.

Pupa of *Brahminacoriacea*

Adult beetles of *B. coriacea*

Nature of damage: Initially young grubs feed on mother tuber, roots of developing potato plants, but after tuber formation, the older second instar and third instar grubs feed on the under ground potato tubers by making large, shallow and circular holes into them and thus rendering them unfit for marketing. They live concealed while feeding on tubers and plants continues to grow normally without any reflection of injury on aerial parts. The grubs of B. coriacea are smaller in size and more number of grubs can seen feeding on a single tuber. This results in the formation of numerous holes on all sides of tubers.

Potatoes nibbled by second instar grubs of *B. coriacea*

Population dynamics: Abundance of *B. coriacea* beetles on light trap and host trees were recorded during May-July. About 26.37 per cent tuber infestation in potato was recorded during second week of October in Shimla hills. Local outbreaks of *B. coriacea* in Shimla hills since 1980's have been attributed to increased cultivation of grassy areas. Due to large scale deforestation, the beetles have moved into areas near the agriculture fields for feeding on shrubs/fruit trees and resulted in egg laying in the cultivated areas and thus becoming pest of crops.

Monitoring and action threshold: Begin monitoring for white grubs in June. Examine the soil surface for actively feeding larvae. It may be necessary to fold back small areas of turf to reveal

underlying insects. An average exceeding 10 grubs/m^2 may warrant a suitable control. Burying potato pieces in and around damaged areas will attract the feeding grubs for easy collection and disposal. Estimates of the density of the soil inhabiting stages are done by taking sample units of 0.09 square meters of soil to a depth of 30 cm. The soil samples are examined and larvae counted. The grubs may damage potato crops on land that has recently been in sod. If feeding on potato is severe, damage is indicated by dwarfing or wilting of the plants. The grubs chew deep cavities in the tubers, making them totally unmarketable.

Integrated management

Cultural control: planting of susceptible plants in recently ploughed grass sod should be avoided. Infested fields should be harrowed, which kills the grubs by physical injury or exposes them to natural enemies and the elements. Tillage should be timed between early May and late June to kill the second year grubs and from late July to early September for first year grubs.

Chemical control: Insecticides are most effective if applied when the grubs are smaller and are actively feeding near the soil surface. Late July or early August applications are usually recommended. Applying during warm, wet weather will also increase spray efficacy. Excess thatch should be removed as it acts as a barrier, preventing adequate penetration of the chemical. Chlorpyriphos 20EC @ 400g a.i./ ha after mixing it in the sand should be applied at the time of first earthing up operation in potato crop. There should be sufficient moisture in the soil at the time of application and the insecticide should be thoroughly mixed in the soil so as to translocate sufficient quantity of insecticide to the root zone where the damage is actually inflicted. In fields, application of chlorpyriphos 20 EC @ 800g a.i./ ha is recommended. The chemical as mixed in sand and broadcasted in the fields prior to halod so as to mix it thoroughly in the soil. This pest causes damage in alternate year, but chemical should be applied every year for effective control.

Conclusion

B. coriacea is distributed in mid and high hills. The beetles exhibited distinct preference for a particular host in a particular locality. The traps can be used for monitoring and suppression of initial pest population. Further, need based use of biopesticides which are selective and eco-friendly can be used in ecofriendly pest management programs.

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