Dry Beans XIII-5

Mexican Bean Beetle

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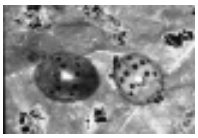


Mexican bean beetle adult.

Mexican bean beetle is perhaps the most serious insect pest of dry beans in the High Plains region. Recent research has pointed to the usefulness of sampling egg masses in early July to make treatment decisions rather than waiting until damage has begun.

Identification (and life cycle/seasonal history)

Mexican bean beetle adults overwinter in debris in fields, along field margins and in fence rows. The beetles move out into the dry bean fields over an extended period of time in June and July. Females begin to lay egg masses on the beans after they have fed for 1 to 2 weeks. The overwintering adults are bronze in color and about 1/4 to 1/3 inch with 16 black spots on their wing covers. Bright yellow eggs are laid in masses of about 40 to 60 eggs each (Plate 99). Each female may lay up to 500 eggs over a 5-week period. Eggs will hatch in 5 to 10 days, and larvae are bright yellow with branched spines that give the larvae a fuzzy appearance. The spines of the later instars are black. Larvae will mature over the next 3 to 4 weeks, after which they pupate for about a week. Adults that emerge from the pupae will initially be bright yellow with black spots. Generally, one or two generations develop in this region. Eggs of the first generation will hatch in late June or July, and larvae develop through July into August. The next generation of adults will emerge in late July or early August and lay eggs in early August. Larvae of this second generation will mature through August and pupate in late August or early September.

Plant Response and Damage

Larvae and adults of the Mexican bean beetle feed on the underside of leaves, stripping the epidermis from the leaf and leaving a window-pane or skeletonizing damage. Leaf consumption increases as larvae increase in size. Two-thirds of the leaf area consumed by the larva will be consumed by the fourth or last instar larva. An adult beetle will also do considerable feeding and can consume over three times the daily leaf surface area as the fourth instar. If large numbers of larvae are still feeding when leaves are mostly yellowed, some larvae may begin to feed on the pods that remain green. This pod feeding does not commonly occur.

Management Approaches

Individual field history can be an important factor in determining beetle potential. Significant Mexican bean beetle populations will result when beetle populations the

previous year were high and winter conditions were mild. Cold temperatures and minimal snowfall will result in increased winter mortality.

The following considerations are important in managing Mexican bean beetle in dry beans:

- Avoid early planting because overwintering adults are attracted to these fields and often concentrate in these early emerging fields.
- Scout fields for Mexican bean beetle adult damage after emergence, especially early planted fields. Adults may congregate in fields and cause significant early season defoliation on small beans.
- Avoid unnecessary insecticide applications to preserve biological control species. Many predator species are often present and these may impact egg mass survival.
- Preplant systemic insecticides can be used in fields that have a high risk of damage (e.g. planted early, and/or experienced very high populations previous year with mild winter).

The major defoliation from the Mexican bean beetle will begin in mid July and continue through August. Two sampling methods can be used to determine the potential for economic damage: egg mass sampling and defoliation/larval sampling.

Egg mass sampling is carried out just after the peak egg laying period (early to mid July). The number of egg masses found per meter (about 1 yard) of row is determined by sampling at several sites in a field. Egg mass densities are often more concentrated on field edges bordering overwintering sites (e.g. ditches, shelter belts, previous year's cornfield). The economic threshold is 0.5 egg mass per meter (yard) of row. The threshold will increase or decrease depending on cost of insecticide, crop value, and beetle survival factors. Egg mass sampling has several advantages over sampling later when larvae are actively feeding. Egg mass sampling allows the grower to make a timely decision on the need to treat before damage has begun. In many cases, ground equipment can still be used to treat for beetles if row closure has not occurred. If aerial treatment is preferred, treatments can be scheduled for timely application before significant defoliation has begun.

Defoliation/larval sampling can be done as the insect is feeding in the field (Late July-early August). This is often difficult to do because feeding by the late instars often results in rapid defoliation. As a result, timely treatments are often complicated by delays in sampling and in applicator scheduling. This damage should be monitored as larvae are developing into the final instar and again as adults begin to emerge from the pupae. Treatment may be justified at this time if 1 larva per plant is present or average defoliation is approaching 5 to 15%. When plants mature near the end of pod fill (about mid to late August), damage from Mexican bean beetle will become less important. Treatments in late July and early August may often be timed to also provide good control of western bean cutworms (see western bean cutworm chapter).

Management Approaches—All Defoliating insects

Damage from all defoliating insects must be judged based on the potential they have for creating increased defoliation. A number of randomly chosen plants should be examined and defoliation estimated to arrive at an estimate of the current defoliation. Examples of several defoliation levels on dry bean leaves are shown in *Figure XIII-1*. Defoliation of plants or individual leaves is difficult to estimate and often is over-estimated. These examples can be used as guides to estimate leaf defoliation.

The impact of defoliation from insects will depend on a number of factors. Perhaps the most important are the amount of defoliation that takes place and the plant growth stage. Plants in early vegetative stages of growth can withstand much more defoliation with little impact on yield, whereas, beans that are flowering or filling pods can tolerate much less damage before yield loss is impacted significantly. *Figure XIII-2* shows an example of the relationship between defoliation and yield loss for navy beans from manual defoliation (not insect induced). This information can be used as a guideline in determining the amount of defoliation that is tolerable. Forty percent defoliation of vegetative beans will result in only about five percent yield loss. However, 40 percent defoliation of flowering and pod filling beans will result in about 15 percent yield loss. Flowering and pod filling beans will suffer five percent yield loss from only about 10 to 20 percent defoliation. Research is underway to determine this relationship for insect damage to dry beans in the Central High Plains.

In addition to estimating the defoliation level of beans, it is important to determine the population level and status of the insect that is doing the damage. For treatment to be warranted, the insects must be present in large enough numbers and in a stage where increased damage is likely.

Figure XIII_1. Six levels of bean leaf defoliation (adapted from original by J. Barrigossi).

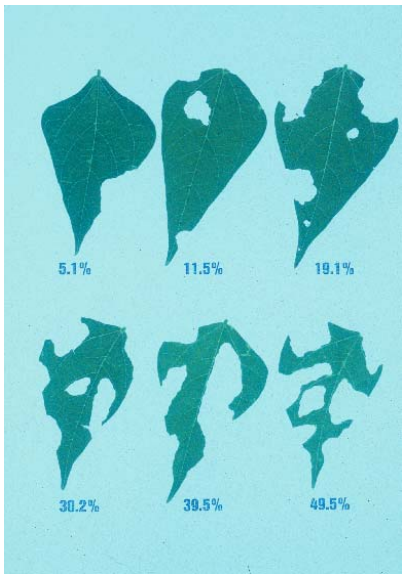
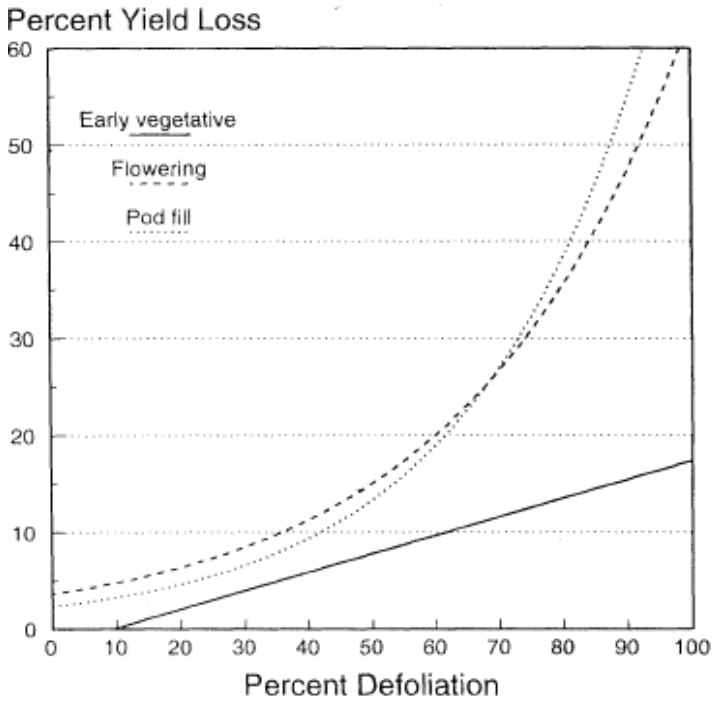


Figure XIII_2. Relationship between percent defoliation and yield loss at different bean growth stages (Adapted from Schaafsma and Abbott, 1994, J. of Prod. Agr. 7:202_205).



Products for Mexican Bean Beetle:

Insecticide	**Product**	**Preharvest Interval , remarks**
Asana XL[R1]	2.9-5.8 oz./A	PHI 21 days; REI 12 hrs.
cyfluthrin[R1] (Baythroid, generics)	See label for rates.	PHI 21 days; REI 12 hrs.
Di_Syston 15%[R], 8[R]	15%:6.0 oz./1000 ft 8:0.9-1.9 oz./1000 ft	PHI 60 days; REI 72 hrs.
dimethoate[1] multiple formulations	See label for rates.	PHI see label; REI 48 hrs.
Lannate WSP[R], LV[R]	WSP:0.25-1.0 lbs./A LV:0.75-3.0 pts./A	PHI 14 days; REI 48 hrs.
Mustang MAX [R1]	2.72-4.0 oz./A	PHI 21 days; REI 12 hrs.
Orthene/acephate multiple formulations	See label for rates.	PHI 14 days; REI 24 hrs.
Penncap_M[R]	2.0 pts./A	PHI 15 days; REI 48 hrs.
Phaser 3EC	0.66-1.33 qts./A	PHI 3 days; REI 24 hrs.
Sevin/carbaryl[1] multiple formulations	See label for rates.	PHI 21 days; REI 12 hrs.
Temik 15G[R]	7.0-14.0 lbs./A	Apply at planting. Potential for groundwater contamination. See label for environmental precautions and restrictions. PHI

		90 days; REI 48 hrs.
Thimet 20G[R]	4.9-9.4 oz/1000 row ft	Apply at planting; drill to side of seed, not in contact with seed; PHI 60 days; REI 72 hrs.
lambda-cyhalothrin[R1] (Warrior, generics)	See label for rates.	PHI 21 days; REI 24 hrs.
Seed Treatment		
Cruiser 5FS	1.28 oz/100 lb seed	See treatment directions and precautions on label.

[R]Restricted use pesticide [1]Labeled for chemigation

Categories: Dry beans, Mexican bean beetle

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