Treat grasshoppers now, before they mature

Significant populations of newly hatched grasshoppers are showing up all across the state in grasslands and in areas bordering crop fields. During the early stages after hatching, grasshoppers can have very high mortality if conditions are cool and wet. However, conditions across the entire state have been ideal for these young hoppers to survive very well. As a result, we are apt to be dealing with these insects for a good deal of the summer. **The best approach to this problem is to try to control the grasshoppers while they are small, relatively easy to control and concentrated in their hatching beds before they spread throughout the crops.**

Grasshoppers are easiest to control in the 3rd and 4th instar stages. Adult control measures are less effective.

Because grasshoppers move into cropland from untilled hatching beds around field borders and in grasslands, grasshopper surveys should be conducted in these adjacent untilled areas early in the season. If grasshoppers have already invaded the field, they can be sampled to determine if control is warranted. With lots of dry grasses in these hatching areas this year, hoppers will likely move to adjoining crops earlier in the summer.

Sampling /thresholds

Estimating grasshopper densities is difficult and can only be done accurately with some practice. The best method for determining grasshopper density in field borders or hatching areas is to count the number of grasshoppers by using the square-foot method. With practice, this approach can provide good estimates of hopper density. To use this method, randomly select an area several feet away and visualize a one-square foot area around that spot. Walk toward this spot while watching this square-foot area and count the number of grasshoppers that you see in or jumping out of this area. Repeat this procedure 18 times and divide the total number of grasshoppers you saw by two. This will give you the number of grasshoppers per square yard (9 square feet). Counting sites should be chosen at random. **Just after hatching, when grasshoppers are small, they will be difficult to see and you likely will underestimate the true hopper density**. When sampling, vary the vegetation in the count area, and sample both north and south facing slopes.

To sample for grasshoppers within fields where grasshopper density will be lower, use the same method except visualize and count the hoppers in a square yard area. Because of the difficulty of seeing hoppers in this larger area, counts will be somewhat less accurate.

Take 18 samples and divide the total by 18 to arrive at the average number of grasshoppers per square yard.

When the number of grasshoppers per square yard has been estimated, use *Table I* to determine if treatment is necessary. While sampling it is important to determine the species present and the approximate stage (instar) of the grasshoppers. This is best done by using a sweep net to allow capture of a representative sample of hoppers.

Grasshopper control in cropland

Grasshoppers are easiest to control in the 3rd and 4th instar stages before they become adults. The size of these stages will be less than ½ inch in smaller species and 3/4 inch in larger species. Numerous insecticides are labelled and effective for grasshopper control on various crops. These are summarized in the NebFact: A Guide to Grasshopper Control in Cropland. Most of these will be effective when grasshoppers are immature. Tremendous variability in control will occur later in the summer when the grasshoppers are adults. If a range of rates is listed for a given insecticide, the higher rates generally should be used once adults are present. Always follow the recommended label rates, application directions, and restrictions.

Often border treatments are used to protect cropland from grasshoppers. However, in years like this when populations may be extreme, border treatments may not provide season long control. The size of the border treatment needed is difficult to determine. It may be effective with as little as 150 feet or as much as 1/4-1/2 mile may be needed if the grasshopper source area is large. A border spray should be effective for at least 7-14 days, depending on re-infestation pressure. Also, the residual activity of the treatments will vary with the chemical and environmental conditions. It is important to monitor the border areas and crop margins

Management tips June 21-July 5

Gather complete field notes: To make informed decisions using site specific management, keep detailed notes of what was done in a field (management), what happened in the field (nature), the crop growth stage at the time, and most importantly, where it occurred. This detailed field information is especially important to help explain why yield differences shown on the yield map occurred where they did and what can be done to address them. Important examples at this time of year include: post emergence herbicides used and crop growth stage when applied; crop stresses due to hail, heat, drought, cultivation, insects, weeds, or other causes and crop growth stage at the time; and amounts and timing of irrigation or rainfall.

Grass seed harvest is just around the corner-are the sickles on the swathers and the combine ready? It looks like most bluegrass fields will be in the swathing stage during the first ten days of July.

Common stalk borers have been moving into corn from nearby grassy areas and damage is now visible. Common stalk borer damage is occasionally confused with corn borer damage (see last week=s issue for corn borer information) but is usually confined to a few rows that border grassy areas. See the May 24 *CropWatch* for further information on stalk borer control.

Black light insect trap reports for several sites are available on the Department of Entomology Web site at: http://entomology.unl.edu/fldcrops/index.htm Reports are available for fields near the following cities: Concord, Clay Center, North Platte, Hastings, Kearney, and Aurora.

after treatment to make sure grasshoppers do not re-enter the field. When spraying borders adjoining cropland, be sure to read and follow harvest and **grazing** restrictions.

When treating borders, it is often necessary to treat the edge of the crop to reduce hopper numbers that have already moved into the field margin. One of the biggest problems with these treatments is that few insecticides are labelled for treating both crops and the surrounding areas, whether it be rangeland/pasture or non-crop areas. Malathion (e.g. Atrapa) and carbaryl (e.g. Sevin) are labelled on most crops along with range/pasture and non-crop areas. Acephate (e.g. Orthene) is labelled for non-crop use, but the only crop it is labelled for is dry beans. Dimilin is labelled on range/pasture and for non-crop use, but it's only additional label is on soybeans. One advantage of Dimilin as a border spray around corn would be the lowered impact on natural enemies, especially those effective on spider mites. Perhaps the best product for this type of treatment is Asana, because it is labelled for non-crop use and for use on several crops (corn, soybeans, sugar beets, dry beans, sunflowers, and potatoes). Of these five products, Asana will provide better control once grasshoppers have become adults, but again control of adults may be variable.

Grasshopper control in rangeland

Only three insecticides are labelled for control of grasshoppers in rangeland, and none of them will be very effective after they reach the adult stage. The two traditional insecticides used for grasshopper control in rangeland are malathion and carbaryl. A newer product that has shown good efficacy is Dimilin. This chemical is a growth regulator that inhibits the moulting process in grasshoppers. It will not affect adult grasshoppers, but likewise, it will not affect adult natural enemies. The label states that it should be used while the majority of hoppers are in the 2nd and 3rd instars (about 1/4-1/2 inch). Mortality will be delayed until the treated insects begin to moult, usually in three to seven days. These three products do not have grazing restrictions for rangeland treatments and can be applied while the cattle are still grazing.

Low cost treatments using these products have been developed by the University of Wyoming in a program called Reduced Agent and Area Treatments (RAATs). This program has been effective at reducing cost of treating rangeland by 50% or more. Cost estimates are about $3 per acre with treatments on alternate swaths (50% untreated area). This brings overall costs to about $1.50 per acre. This program should be investigated if rangeland treatments are being considered. Timing and application details are critical to the success of this program. (See University of Wyoming Web

Table 1. Treatment guidelines based on number of grasshoppers (nymphs and adults) per square yard.

Grasshopper population	*Within fields*	*Field borders*	*Treatment necessary?*
Non-economic	0-2	5-10	No
Light	3-7	11-20	Questionable, depends on size, species, crop
Moderate	8-14	20-40	Probably
Abundant	15 or more	41 or more	Yes

site below.)

Further information

Pesticide registrations are constantly changing. Updated lists of pesticide registrations for various crops can be found at the University of Nebraska Department of Entomology Web site at http://entomology.unl.edu/fldcrops/pestipm.htm The following Web sites contain extensive information on grasshoppers and grasshopper management:

i. University of Wyoming: http://www.sdvc.uwyo.edu/grasshopper/
ii. USDA-ARS in Montana: http://www.sidney.ars.usda.gov/grasshopper/index.htm

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Economic Thresholds

The economic threshold or density of a pest at which control measures become economically viable, have been established in most cereal crops. It will depend on the stage of the insect, type of crop, crop stage, growing conditions, cost of control, and the current market value of the crop. The most serious economic damage due to grasshoppers will be while they are in the third to fifth Nymphal stages. Since there are a number of factors to consider, the economic threshold can be variable. **Considering these factors the economic threshold in cereal crops ranges from 8 to 12 grasshoppers per square metre.**

Feeding preference studies has shown that oats is an exception and is not a preferred food source for grasshoppers. If choices are available the grasshoppers will ignore oats in favour of a more desirable food source. Peas are another example of a non-preferred crop. In both these cases even if grasshoppers do feed on the crop damage is more limited and their biotic or reproductive potential is reduced. Therefore they can be used as a guard strip around more preferred crops.

This strategy is a reverse of the trap strips previously considered. In this case the grasshoppers will tend to look for other food options rather than penetrate the guard strip into the main crop.

Lentil are more susceptible to grasshopper feeding than other crops. Casual observation of grasshoppers in lentil would suggest this is not a preferred crop as they do not appear to feed on the foliage and the dense vegetative growth creates an unfavourable habitat for the insect.

Within the canopy a cool, moist micro-climate is created which can be detrimental to grasshoppers. However, grasshoppers are partial to developing lentil pods above the canopy. They will even spread the flower parts to consume the early minute pods. This

type of damage can result in delaying maturity as the plant tries to compensate by producing new pods.

Yield losses can result if entire pods are consumed but even moderate feeding on the pods will break the integrity of the pod, resulting in premature shattering and subsequent yield loss. If the feeding on the pod is less severe but still results in holes in the pod it increases the risk of disease and staining of the seeds which will result in a grade loss. **Because of these factors the economic threshold in lentil is considered to be only 2 grasshoppers per square metre.**

Because of the value and extent of canola grown in the province, an economic threshold for grasshoppers in this crop is being studied. Early observations suggest that **B. nopus varieties have more trouble compensating from grasshopper feeding than do B. rapa varieties**. B. juncea varieties appear to recover best out of the three.

These are not highly preferred crops **for some species of grasshoppers** but early results suggest an economic threshold of about 15 grasshoppers per square metre.