Wild Blueberry
FACT SHEET
THE UNIVERSITY OF MAINE Cooperative Extension

Integrated Crop Management Field Scouting Guide for Lowbush Blueberries

Fact Sheet No. 204, UMaine Extension No. 2275

What is Blueberry Integrated Crop Management (ICM)?

Blueberry ICM is an approach to managing blueberry fields for the best economic and environmental results. With ICM, you strive to produce the best quality harvest while minimizing use of pesticides or fertilizers. By monitoring insect, disease and weed populations as well as fertility and pH regularly, you acquire information to make sound pest and nutrient management decisions. ICM encourages a combination of preventative, cultural, biological and chemical methods of pest management, based on economic and environmental factors. It includes:

- Monitoring your fields on a regular basis and that you record your findings. Records of applications with powered equipment must be kept by law. Keep records to compare results of chemical and cultural controls over the years. Make copies of Blueberry ICM tables found at end of this fact sheet and use it for your records.
- Using the Time Table of Pest Abundance as a guide to determine what pests you should be looking for. Monitoring of soil temperatures one inch below the surface will allow you to determine the date blueberry maggot flies emerge (refer to Wild Blueberry Fact Sheet No. 201).
- Establishing a path or scouting pattern that will enable you to sample your field.
- Using cultural management techniques to minimize the need for pesticide applications.
- Determining the extent of pest infestation and deciding if it is serious enough to warrant control.
- Using leaf sampling to determine the fertility needs of your plants before applying fertilizer.
- Detecting and treating pest problems early will mean you can control the problem with fewer resources. For example, the larger blueberry spanworm and blueberry flea beetle larvae get, the more difficult they are to kill with insecticides and the more destructive they are because they eat more.

Cultural Management Techniques

The following cultural methods will help reduce pest problems, but they are not control measures. Refer to *Wild Blueberry Fact Sheets No. 209*, *219* and *239* for cultural control information on specific pests.

- Burning as a pruning technique may reduce insect pests such as blueberry flea beetle and blueberry spanworm that live in the litter. It may also be used to spot treat small insects such as blueberry thrips in leaf curls after plant emergence and disease infestations from mummy berry disease.
- Clean equipment (mowers, winnowers, boxes) before moving to another field.

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- Use clean-harvesting techniques to reduce fruit loss and minimize the number of infected fruit left in the field.
- Compost or burn any winnower refuse after harvest. Blueberry maggot fly and mummy berry disease can be concentrated in a field by not disposing of a winnow pile.
- Mulch bare spots in field to encourage blueberry spread and to reduce weed encroachment.
- Cut annual weeds before they go to seed and cut perennial weeds back several times a season to suppress growth.

Management Techniques for Insect Pests

Action Thresholds: When is Pest Control Necessary?

Base your decisions for managing pests on the damage potential from a pest infestation. Take control measures only when the potential for damage reaches the pest level or threshold where unacceptable or economic losses to the crop may occur. It is important to know when you need to control a pest. Action thresholds or ranges have been developed for several blueberry pests.

To determine if an insect pest population is large and serious enough for control measures to be implemented, use a recommended sampling or monitoring method to capture insects. Compare the average number of insects captured with the recommended Extension action threshold.

Thresholds are the **average** number of insects per unit sample within a specific field. For example, to calculate the average number of spanworm larvae per set of 10 sweeps after taking 20 sets of 10 sweeps, add the number of larvae caught in each set of ten sweeps and divide this sum by 20 (the number of sets of 10 sweeps).

- The action threshold is the pest population level at which control measures should be considered to avoid economic losses to the crop. The potential economic loss should exceed the cost of control before you consider control measures.
- If the average number of insects is equal to or greater than the action threshold, consider control measures.
- If the average number of insects is less than the action threshold, no action is necessary but the field should be sampled again within 3 days if its been hot, or 7 days if it's been cool.
- If a high population is found in a portion of the field, then consider a spot-treatment of that area of the field.

Monitoring Blueberry Insects: How to Sample a Field

Sampling with a sweep net: The sampling procedure to use for most insects (spanworm, flea beetle, sawfly, etc.) involves a single sweep of a 12inch diameter net from one side of the body to the other (180 degrees). One sample is ten sweeps. While walking through the field, keep two hands on the handle and sweep the foliage. Do not take more than one sweep for every step, and be sure the net penetrates the foliage. After taking ten sweeps, shake everything into the bottom of the net. Empty the contents into a tray, box or other container, and count the number of insects of each species. Write down the results.

Number of samples: Take at least one set of ten sweeps every 100 to 200 feet. The number of sets of 10 sweeps (samples) should be about 10 to 20 for fields of 1 to 10 acres, 20 to 30 samples for fields of greater than 10 acres and less than 50 acres, and 30 samples for fields greater than 50 acres. Include weedy and rocky areas, field edges and "dips" or "hollows" in your sample; insects are commonly found in these areas. While walking to the next sample site, look around and note anything unusual, such as malformed or brown leaves; check these areas closely. Make notes or draw a map so that areas with suspected infestations can be located at a later date.

Watch for defoliated areas within crop fields or delayed emergence of blueberry stems in pruned fields. However, do not automatically assume any area with no foliage has been damaged by an insect. Look for the evidence of feeding (chewed leaves and stems) and/or the presence of insects.

Blueberry Maggot Fly Monitoring: This requires the use of a baited yellow sticky trap. Refer to Wild Blueberry Fact Sheet No. 201, *Monitoring for the Blueberry Maggot*, for details on use and placement.

Schedule for Monitoring Blueberry Insects

Blueberry spanworm (Refer to Wild Blueberry Fact Sheets No. 197 and 209).Threshold in a crop-year field is ten larvae per ten sweeps, and five or more per ten sweeps in a prune-year field. Larvae feed from late April through late June. On crop-year fields, begin monitoring in early May (bud break). On prune-year fields, begin monitoring when blueberry plants begin emerging.

Blueberry flea beetle (Refer to Wild Blueberry Fact Sheets No. 200 and 209). Threshold is 50 larvae or adults per ten sweeps. Larvae feed from mid-May to mid-June. Adults feed from late June to late August. There are approximately two weeks between last larvae and first adults.

Blueberry sawfly (Refer to Wild Blueberry Fact Sheets No. 206 and 209). Threshold is 50 larvae per ten sweeps. Larvae feed from early May to mid-June. Begin monitoring in mid-May; the first in-star larvae are feeding in developing leaf buds and are not collected in sweeps early in May.

Blueberry thrips (Refer to Wild Blueberry Fact Sheets No. 202 and 209). Watch for patches of tight, red leaf-curls in prune and crop-year fields throughout the season, beginning in early June. Stake out infested areas. Thrips' curls begin appearing in pruned fields as plants emerge and develop; however, any chemical treatment should be done during the **next** pruning cycle, as blueberry plants are emerging. Sky-blue sticky cards may be used to monitor for blueberry thrips for more efficient timing of insecticides. In the staked out infested areas, place 2 to 3 sticky cards in mid-May. These cards should be attached to short wooden stakes and placed 3to 4 inches above the soil surface. The traps should be checked every three days and inspected for the small lemon yellow thrips. A hand lens or magnifying glass should be used since thrips are extremely small insects. The first presence of thrips on the traps or the first noticeable leaf curl signals the time for the first insecticide application.

Red-striped fireworm (Refer to Wild Blueberry Fact Sheet No. 205). No thresholds or treatments have been developed. Recent research findings have shown that red-striped fireworm infestations do not result in significant crop loss, but, extremely high densities can be a nuisance in the processing line as the fireworm caterpillars tend to wander over the berries. Leaf-tying activity may begin as soon as early July. Larvae can be found inside the tied-up leaves through October.

Blueberry maggot fly (Refer to Wild Blueberry Fact Sheet No. 201 and Wild Blueberry Fact Sheet No. 209). Action threshold is six flies per trap per visit or a cumulative total of ten flies per trap. Traps should be in the field by the last week of June and checked every three to four days.

Note: Significant populations of other minor pest insects should be noted as they occur.
Strawberry Rootworm (Refer to Wild Blueberry Fact Sheet No. 199). This insect causes damage similar to the blueberry flea beetle, so use flea beetle timing and thresholds.

Blueberry Leaf Beetle (Refer to Wild Blueberry Fact Sheet No. 203). This insect can cause considerable damage by skeletonizing foliage which later turns brown. The largest number of adults occur between May and early June. Adults feed on the foliage well into the fall.

Grasshoppers (Refer to Wild Blueberry Fact Sheet No. 198). May be abundant from mid-July through September. May chew on some foliage and fruit but do not cause economic damage that warrants control.

Management Techniques for Diseases

Thresholds for diseases have not been developed. Cultural controls will keep disease populations from building up but will not prevent outbreaks if the weather conditions are favorable.

Early detection and treatment is necessary for good disease control. The disease must be detected two years before treatment. Control of mummy berry requires a protectant spray at bud break, before any symptoms of the disease are visible. Both temperature and wetness should be monitored to determine if a fungicide spray is needed. Refer to Wild Blueberry Fact Sheet No. 217, *An Alternative Method to Control Monolinia Blight*, for details.

Diseases such as red leaf and witches broom do not have any chemical or cultural controls, so the plants must be pulled up or treated with herbicides to prevent the spread of the disease.

Schedule for Monitoring Blueberry Diseases

Mummy Berry (Refer to Wild Blueberry Fact Sheets No. 211, 217, 218 and 219).

Symptoms of the disease appear two to three weeks before full bloom and appear as wilted leaves, which dry to a medium brown. On some leaves, only the center of the leaf may show the reddish-brown symptoms. Infections may progress into the stems. Monitor on crop fields only. Begin monitoring in late April or early May through bloom, ending in late May or early June.

To get an assessment of disease pressure, use a 0.25 yard frame and place it in the field at set intervals, for example every 100 paces. Count the number of blighted upright stems and blossoms. Comparing the infection rate from year to year will give an indication of the disease severity and need for treatment.

Blossom blight (Refer to Wild Blueberry Fact Sheets No. 211, 218 and 219). Symptoms appear as blossoms turn light brown and develop a grayish-brown mold. Blight may also progress to infect leaf or stem. For crop fields only, begin monitoring during bloom in mid-May through early June.

Red leaf (Refer to Wild Blueberry Fact Sheets No. 218 and 219). Symptoms appear as leaves change from green to red, with a white layer of spores developing on the underside of the leaves later in the season. For crop and prune fields, monitor beginning mid-June and continue until the end of the season.

Powdery mildew (Refer to Wild Blueberry Fact Sheet No. 219). Disease symptoms on leaves may appear as large red spots or rings to a white mildew appearance, which may result in loss of leaves. For prune fields, monitor from June until the end of the season.

Witches' broom. Symptoms appear as a broom like mass of swollen stems. For crop and prune fields, monitor from emergence until the end of the season.

Management Techniques for Weeds

The primary goal of weed management is to optimize yield by minimizing weed competition. Weeds reduce yields by competing with the crop for water, light and nutrients. No single method or chemical will control all weeds; each tends to reduce some weeds while encouraging the growth of others. Therefore, a combination of cultural techniques, the wise use of herbicides and careful monitoring of the weed situation in a field form a basis for a sound weed management program. Do not expect chemicals to completely control all weeds. Select herbicides based on what specific weed species are present in the field. Further information on weed management and control measures may be found in Wild Blueberry Fact Sheets No. 235, 236, 237, 238 and 239.

Early detection and proper identification of weeds are important aspects of your weed management program. Detecting and spot treating small infestations before weeds spread will prevent major weed problems later on. In addition to the Wild Blueberry Fact Sheets on weed identification (No. 241 through 249), an identification guide is helpful. Two sources are:

- *Weeds of Eastern Canadian Blueberry Fields*, 1990. M.G. Sampson, K.V. McCully and D.L. Sampson, Nova Scotia Agricultural Bookstore, P.O. Box 550, Truro, NS Canada B2N 5E3.
- *Newcomb's Wildflower Guide*, 1977. Lawrence Newcomb, Little, Brown and Company, Boston.

Weed Maps

Weed problems may not be evenly distributed over the entire field. Localized problems of severe infestation or atypical field conditions (such as wet areas) should be recorded on a weed map. This will show you where a problem exists and enable you to monitor the movement or change over time. Areas of severe infestations or specific species can then be targeted for specific control, rather than treating the entire field needlessly or failing to control the weed problem at all.

If you do not have a map of the field, you should make a rough sketch of the boundaries, including landmarks, roads and compass direction. Have a number or name assigned to the field. The following

information should be recorded on the Blueberry ICM table (see page 9), and location of these items should be indicated on your map.

Weed species. If not known, indicate if annual or perennial and grass/sedge/rush (see Wild blueberry Fact sheet No. 248, *Weeds 8* for differences) versus broadleaf.

Abundance of each species according to the following:

Few one or two weeds or clumps per square yard.

Common five weeds or clumps per square yard.

Abundant 20 or more per square yard; weeds found in large numbers.

Distribution is important and may be rated as follows:

Spotty found in a few places around the field.

Local found in a small portion of the field

General found throughout most of the field.

Weed size is important for the timing of some control options and should be indicated as:

Small below the height of the blueberry plant

Large above the height of the blueberry plant

Schedule for Monitoring Blueberry Weeds

With prune fields: At blueberry emergence (mid-May through early June), look for seedling weeds such as St. Johnswort, perennial weeds such as bunchberry, woody weeds such as birch, or grasses growing in or between blueberry clones. From mid-June through July, look for weeds taller than blueberries such as bracken fern or dogbane.

With crop fields: From July through mid-August, look for weed density and type for assessment of what is needed for next year's preemergence weed control.

Schedule for Monitoring Pollinators

Monitoring of commercial honey bees or commercial bumble bees will allow you to assess the adequacy of your stocking density of bees and the adequacy of your hive placement throughout the field. In addition, monitoring the number of bees in your field will allow you to see if bees are visiting the blueberries in your field or if they might be fixed on other wild flowers. Native bee numbers can also be assessed which may help you determine how many honey bee colonies you need.

Prior to bloom you should stake out 8 to 10, 3ft x 3ft square areas in your field. One third (2 to 3) of the staked areas should be near where hives are to be placed or near a field edge, another third of the staked areas should be one quarter of the way into your field, and the remaining third of the staked areas should be in the middle of your field. During peak bloom, the staked areas should be visited between 10 AM and 2 PM on a warm sunny day with little wind. You should approach the staked areas slowly and sit about 1 yard from the staked area. Observe the blueberry flowers within the staked area for one minute and count all honey bees and other bees that visit. Try and visit all areas once and repeat the monitoring at least on one other day. Add the counts of the bees for each staked area and average them.

A "rule of thumb" estimate from previous research suggests that 2.4 bees (honey bees) per staked area for one minute is a high density of bees and additional hives are not necessary, a density of 2.0 bees suggests that 1 additional honey bee hive may be needed for adequate pollination, a density of 1.3 bees suggests that 2 additional hives may be needed, a density of 0.9 bees suggests that 3 additional hives are needed, a density of 0.6 bees suggests that 4 hives are needed, and between 0.2 and 0 bees suggest that 5 or more hives might be needed. Native bees are more effective pollinators and fewer are needed per acre. On average, native bees are about 2-4 times more efficient in pollinating wild blueberry and bumble bees can be up to ten times more efficient (see Wild Blueberry Fact Sheet #302).

During weed mapping, a survey of the flowering plants around the field border can be conducted quickly and will allow you to determine whether you have good floral resources just outside of your field to enhance wild bees for pollination. (see Wild Blueberry Fact Sheet #301 for a list of bee forage species).

Management Techniques for Fertility

A proper balance of nutrients is required for optimal growth and yield. Adding nutrients that are not needed can result in excessive vegetative growth, winter injury and could reduce yields. In addition, the fertilizer not needed will promote weed growth and could pollute ground water. Samples of blueberry fields throughout the state indicate that many fields could benefit from fertilizer. Soil tests will only give an indication of the pH level in your field. To get fertilizer recommendations, you must take leaf samples at the tip-die back stage of growth on your prune-year fields. Refer to Wild Blueberry Fact Sheet No. 222 for sampling procedures and Fact sheets 223 and 225 for interpreting results of the leaf nutrient tests and fertilizer recommendations.