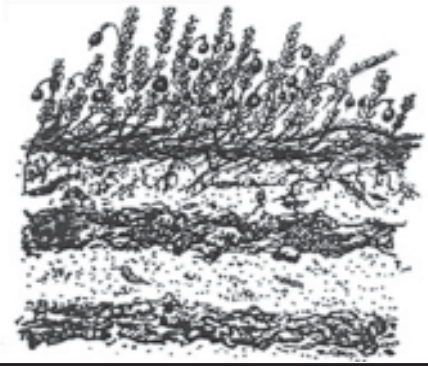

BEST MANAGEMENT PRACTICES GUIDE FOR MASSACHUSETTS CRANBERRY PRODUCTION

Sanding

Sanding is the most commonly used cultural practice in cranberry production in Massachusetts. Growers apply a thin (1/2 to 2 inch) layer of sand on the surface of producing cranberry bogs at 2 to 5 year intervals in order to promote growth, improve productivity, suppress disease, and reduce insect populations. Sanding, as a pruning mechanism, is particularly well suited to the cranberry system: runners are anchored and bare wood, at the base of uprights, is covered thus promoting rooting and the production of upright stems (the portion of the plant that bears the crop). Mechanical pruning can be less than optimum due to the trailing nature of the cranberry growth habit and removal of flower buds (upright tips) during such pruning.

Sanding covers the leaf litter ('trash') layer on the floor of the cranberry bog. This has several benefits, including stimulation of organic matter decomposition (nitrogen release and relief of root congestion), suppression of fruit rot fungus inoculum, and limitation of the habitat of cranberry girdler larvae which feed on the area of the stem that is covered by the leaf litter layer. Sanding improves soil drainage and can physically strengthen peat soils so that mechanical operations on the bog are easier. The sand layer reduces moisture in the upper layer of the soil leading to accelerated warming in the spring and increased release of nitrogen from organic matter in the soil. This increases the potential for growth and productivity without additional fertilizer input. Development of the plants may also be accelerated, so frost hardiness may be lost earlier in the spring. Sand absorbs and releases more heat than the organic layer that it covers so that frost danger is less on sanded bogs (temperatures remain 2-3^{o} F higher on freshly sanded bogs if sand is moist).

By choosing sanding instead of mechanical pruning, growers gain the benefits of insect and disease suppression, improved drainage, better root growth, and some frost protection. This can lead to lower pesticide, fertilizer, and water (frost protection) requirements.

Sanding can be accomplished by several different methods. Those commonly used include sanding on ice, sanding in water (barge sanding), or applying dry sand directly to the vines using ground rigs run directly on the vines or on rails (rail sanding). When choosing a method, growers should weigh several factors, including the following. Ice may not be available when a bog needs sanding. Barge sanding may not anchor runners well (less pruning benefits). Sanding on the vines (dry sanding) is the most likely to be associated with vine injury even if the sanding is done when the vines are dormant. Recent developments in the use of rail sanding may lessen the impact of dry sanding. Sanding is considered important enough that even damaging methods are preferable to no sanding for many growers.

Recommended Practices

General:

- **Stockpile sand responsibly.**

  While the stockpiling of sand is the most efficient, least costly way to make sure that sand is available when needed, loss to water and wind erosion is inevitable if sand piles are left in place for long periods of time.

  Excavated sand should be stockpiled as far away as possible from water bodies and drainage ways. Down gradient silt barriers may also be needed. All efforts should be made to minimize wind erosion.

  Impact on neighbors should be considered when establishing height and location of stockpiles.

- **Ice sanding is the preferred method.**

  Less sand is used in this method and water is held longer (compared to barge sanding) before discharge allowing for better settling of fine particles. This method is generally less costly as well. Barge sanding may not be possible for bogs that have low dikes and are out of grade or where holding a flood for settling is difficult. When ice has not been available, dry sanding and rail sanding may be good alternatives. Differences in efficacy and vine damage have been found for the various sanding methods as follows:

  Vine and bed damage (least to most):
  barge — ice — rail — dry

  Horticultural and pest-control benefit (most to least): ice — rail — dry — barge

  Some growers rate barge sanding benefits more highly than others. It should be noted that a study of evenness of sand distribution showed that, for both ice sanding and barge sanding, less than 25% of the area received close to the target depth of sand. Distribution was quite non-uniform for both methods.

- **Use screened or washed sand with few 'fines' (fine sand, silt, clay).**

  This is particularly important when barge sanding. Avoid sloughed banking materials and subsoil layers which can be high in silt and clay particles. Sand with a high percentage of fine particles can form a surface crust on the soil which restricts water penetration and limits plant growth. Compaction of such soil can limit drainage.

  Fine particles are particularly a problem with barge sanding – they are slow to settle and may lead to sediment discharge when the flood is released. A jar test can indicate the potential for slow settling after barge sanding due to high levels of 'fines'. To conduct such a test: combine 1 oz. sand and 12 oz. water. Agitate for 1 min., allow to settle for 8 hr., and reagitate. With good quality sand, the water should be clear in another 24 hours.

- **Choose coarse sand and apply the proper amount.**

  Coarse sand promotes proper drainage and increases root growth. Particle sizes of 0.5-2 mm are best. Approximately 70% of the particles in the sand should be in this size range. Avoid large gravel, especially if the bog will be dry-harvested.

  The amount of sand to be applied depends on how recently the bog has been sanded and the sanding method chosen. Avoid heavy sand layers applied on deep peat bogs as this can cause compression of the peat and uneven settling of the bog. Applying extra sand to low areas on deep-peat bogs only raises the soil surface temporarily and should be avoided.

  If the bog has been sanded recently, 1/2 to 3/4 inch is adequate. Use more if the last sanding was 4 or more years ago. When barge sanding, apply at least 1 inch. Monitor your sand applications and modify practices to achieve maximum uniformity of sand deposition. GPS technology may be useful in this regard, particularly when barge sanding.

- **Sanding is particularly important in the management of new plantings.**

  Cranberry cuttings are heavily fertilized to promote the production of runners on the new bed. As these runners cover the soil surface, thin layers (1/2 inch) of sand should be applied in order to anchor the runners, promoting rooting at the nodes and leading to the production of upright stems which will then bear the crop. At minimum, new plantings should be sanded after the second season and may be sanded after the first season as well, depending on how much growth has occurred.

- **Know how sanding interacts with late water.**

  Do not use late water following fall or winter sanding. However, you may barge sand in the late water flood. Such barge sanding should occur near the end of the 30 day late water flood period so that the flood may be released after the sanding impoundment time has passed. Avoid sanding in the late water flood if water temperatures are greater than 65º F or if algal growth is present in the water.

- **Know how sanding interacts with herbicides.**

  Casoron: Do not sand on top of this herbicide as the vines will be damaged. Application on top of sand may be made, but must be watered in *immediately* or loss of efficacy will result.

  Evital: Rates of 50 lb/A or less have given good results on sanded bogs. Evital may cause vine damage on poorly drained bogs.

  Devrinol: This material may be used after sanding but must be watered in immediately. Otherwise, the increased light reflected from the sand will enhance breakdown of the herbicide. The use of devrinol after sanding can be critical in controlling nutsedge that may come in with the sand.

  Iron sulfate: Do not use at rates greater than 70 pounds per 1000 ft^2 if the bog has been sanded within 18 months.

- **Sanding stimulates vine growth, use less fertilizer.**

  The spring fertilizer application may be reduced or eliminated in the year of sanding.

- **Sanding helps in the management of cranberry girdler and may suppress and synchronize dodder seed germination.**

  Ice sanding effectively suppresses cranberry girdler, but spring sanding seems to be ineffective. Further treatment such as nematode application may be necessary to adequately control this pest.

  For germination to be effectively suppressed, the dodder seed must be buried by at least 1 inch of sand. Regardless of sanding depth, dodder germination tends to be synchronized after sanding, facilitating control measures.

- **Sanding can be dangerous – take precautions to protect yourself and your workers.**

  Regularly check sanding machines to make sure that protective features are functioning properly. Train all operators to observe safety precautions. Do not clear sand jams with the equipment running. Disc agitators are preferable to bar agitators in preventing jams.

Ice sanding:

- **Exercise caution when moving over deep water covered by ice.**

  This is especially true when moving over ditches and edges. Generally, the ice should be at least 5 inches thick to support the weight of the equipment. Water should be released from beneath the ice if there is a question that the ice is not thick enough to sand safely.

- **Avoid oxygen deficiency damage when ice sanding.**

  Thick layers of sand on top of the ice impede light from reaching the vines. Lack of light can lead to low oxygen levels in the water under the ice and subsequent leaf drop in the spring. This can be remedied by removing the water from beneath the ice after sanding is completed (but before the sand filters down into the water). Drain the ditches sufficiently to avoid leaving puddles on the bog surface.

- **Cracks in the ice and uneven ice settling may be associated with uneven sand deposition.**

  If heavy rains follow ice sanding, sand may be washed through cracks or crevasses and bury vines. Scout the bog after the ice melts and rake or hose excess sand off of the vines.

  During sanding make every effort to apply the sand evenly on the ice. Spotters may be helpful.

Barge sanding:

- **Some bogs should not be barge sanded.**

  Barge sanding should not be used if discharge is to a sensitive water body or if water cannot be impounded to allow settling prior to discharge. Avoid sanding at times when water flow through the bog is heavy. If only poor quality (high 'fines') sand is available, barge sanding should not be used.

  Paddle-wheel barge sanding equipment requires approximately one foot of clearance above the vines. If dikes are low and the bog is out of grade, this may not be feasible. Cable barges require approximately two inches of vine clearance.

- **If you choose to barge sand, certain steps should be taken to minimize sand discharge into outlet water.**

  Make sure that flumes are water-tight and leak-proof.

  Particle settling rate is a function of water temperature. Avoid sanding when water temperature is between 40 and 45º F. Settling is slowest in this temperature range. If sanding must be done at these temperatures, longer impoundment periods for settling may be required.

  Do not sand into harvest water. This may lead to discharge of nutrients off site. Fall barge sanding appears to be less effective than winter or spring sanding.

  When barge sanding, avoid passing over areas which have already been sanded in addition to avoiding overlap. Sediments that are re-agitated will settle more slowly.

  Water should be impounded for at least 5 days; 7 days is preferred. Field studies have shown that significant clearing of the water does not occur for 4-5 days after barge sanding.

  Release the flood water slowly during a 2-3 day period over the top flume board to avoid sediment release.

  When possible, flood water should be released onto another bog and held for an additional day or two. This will further reduce sediment discharge potential. Water may also be released to a retention area.

  Silt traps may be used to retain sediments and prevent offsite deposition

- **Some special considerations when barge sanding.**

  Avoid sanding if water temperatures are above 65º F. High water temperatures may damage the buds, leading to crop reduction.

  If barge sanding in the late water flood or late in the spring, remember that frost tolerance will be affected. After a late water flood, buds will not tolerate temperatures below 30º F.

  Barge sanding leaves a sand deposit on the vines. This will be removed by rain or sprinkler use. Shallow reflooding may make this condition worse by depositing more sand on the vines.

  Do not sand too soon after harvest. An early flood for sanding may delay dormancy and promote winter injury. Many growers have found fall barge sanding to be minimally effective.

Dry sanding:

- **Dry sanding has been associated with more vine damage and crop reduction than other methods.**

  Dry sanding machines may cause ruts on the bog and injury to the vines. Crop reduction in the year of sanding is likely with this practice. To minimize vine damage, dry sanding should only be done when the vines are dormant and the soil surface is not frozen.

  To minimize damage to vines:

  - ✓ Avoid overlaps.
  - ✓ Move ramps frequently.
  - ✓ Reduce air pressure in sander tires.
  - ✓ Limit sander loading, use 1/2 loads of sand.

- **Dry sanding was associated with crop reduction in research plots.**

  Sanded plots showed a decrease in interception of photosynthetically active radiation (less photosynthesis potential). While light interception had recovered to presanded levels by late summer, crop was reduced that year. Due to that recovery and to the increase in new uprights due to sanding, recovery in the second year is likely but may not compensate for the first year loss.

  It is likely that all sanding methods will have some effect on light interception and cropping.

- **Methods that keep sanders off of the vines will minimize damage when dry sanding.**

  Growers have begun to use sanders mounted on rails to minimize the impacts of dry sanding. Dry sanders have also been mounted on booms. Both of these methods are preferable to running heavy sanders directly on the vines.

  Rail and boom sanding may also facilitate more even application of sand, a critical factor when pest control is an expected outcome. An additional advantage of the rail system is the ability to go back over areas to fill in grade drops without incurring additional vine damage.

For further information:

Barge sanding BMP. Fact sheet. Cape Cod Cranberry Growers Association.

DeMoranville, C. J. "Cultural practices in cranberry production: sanding and pruning". in Sandler, H. A., ed. **Cranberry Production: A Guide for Massachusetts**. UMass Extension Publication SP-127. December 1997. Second printing February 1998. pp.6-10.

Water Resource Protection and Enhancement and **Erosion and Sediment Control** BMPs in this series.

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