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## Alfalfa Seed Production

Alfalfa seed production, especially pedigreed seed production, has the potential to become an alternative cash crop in Ontario. Canada imports 2.6 M kg. of alfalfa seeds annually and production is about 3.4 M kg. centred in the Prairie Provinces.

### GROWING ALFALFA FOR SEED IN ONTARIO

There is increasing interest in the production of alfalfa seed in Ontario. Those involved in this venture recently formed the Ontario Alfalfa Seed Growers Association.

In 1987, members reported seed yields ranging from 160 to 400 kg/ha (150 to 360 lbs/acre). The following suggestions have been prepared as a guide, based upon experiences in Ontario and recommendations from Western Canada. As more information is obtained in Ontario, these suggestions may be updated to improve the potential seed yield.

### FIELD SELECTION

Alfalfa requires good drainage and soil pH above 6. Fields with a history of sweet clover should be avoided since sweet clover seed can carry over in the soil, and is very difficult to separate from alfalfa seed. The production of Pedigreed seed is specialized and requires that crops be grown according to specific requirements; for example, the previous crop grown, impurities and isolation distances. For specific information see Canadian Seed Growers Association Circular 6-88.

### FIELD PREPARATION AND SEEDING

For seed production, stands should be thinner than for forage production. The seed should be inoculated with Rhizobium bacteria just prior to planting. Thin stands promote flower production and pollination. Alfalfa leafcutter bees will not pollinate flowers effectively in dense stands-. Seeding rates should be from ½ to 2 kg/ha (½ to 2 pounds of alfalfa seed per acre), seeded in rows up to 75 cm apart (about 30 inches).

### FERTILITY OF ALFALFA SEED FIELD

Most research has concentrated on maximizing forage production, and little information has been developed on the crop's specific fertility requirements for seed production. Nitrogen should not be required provided the seed was properly inoculated at time of planting. Lush growth makes it difficult for the leafcutter bees to pollinate a seed field properly.

### IDENTIFICATION OF INSECT PESTS AND CONTROL

A major problem of alfalfa a seed production can be insect pests. They can attack buds, f lowers and seed pods and if not checked can completely destroy the seed crop. The main pests are the lygus or tarnished plant bug (Lygus lineolaris), alfalfa plant bug (Aselphocoris lineolatus) as well as pea aphid (Acyrtosiphon pisum), potato leafhopper (Empoasca fabae), and grasshopper (Melanoplus ssp.).

Continuous field monitoring is the best method for insect pest control. Samples for insect counts should be made during the bud to early flower stage.

To determine if control measures are required, lygus counts should be made in the early morning using standard 180 degree sweeps of an insect net and averaging the results from 10 to 20 locations about the field. Half of the insect net is swept forcefully through the alfalfa canopy in a 180 degree arc so insects are forced to the bottom of the net. If the right amount of force is used there will be some pieces of alfalfa material in the net, along with some insects if they are present.

The number of insects required to justify spraying has not been determined for Ontario, but in Western Canada treatment is recommended when: (a) lygus adults average 1 per sweep; (b) lygus and plant bug nymphs average 5 per sweep; (c) pea aphids average 1000 per sweep (equivalent 200 per plant).

One must keep in mind that an adequate population of natural predators such as, damsel bugs, lady beetles, green lace-winged flies, and some ground beetles (most feed on aphids but may feed on nymphs of lygus and plant bugs) can keep insect pests in check below the threshold limit. Therefore, the use of insecticides alone to reduce the deleterious insects will also reduce the beneficial insect population in alfalfa seed fields.

Another consideration is that most insecticides are toxic to bees, therefore, extreme care must be used to prevent reduction in activity or loss of bees - this would reduce seed production.

Time of insecticide application is as important as the toxicity since many insecticides have residual activity which can injure the pollinators several days after application.

Insecticide labels should be checked to determine if the product will control the insect pest, as well as its toxicity, residual activity and application rate. For more information on toxicity of insecticides refer to OMAF publication 296.

## **WEED CONTROL**

Weed control is essential for economic production of alfalfa seed. Perennial weeds (Canada Thistle, Perennial Sow Thistle and Quack grass) should be eliminated before an alfalfa seed field is established since it is costly and difficult to eliminate these perennial weeds after the seed field is planted.

Annual weeds must also be controlled because they aggressively compete with alfalfa seedlings for nutrients and moisture, reducing seed yields as well as contaminating alfalfa seed. (see Canadian Seed Grower's Association Circular 6-88 and OMAF Publication 75)

## **POLLINATION**

Alfalfa must be cross-pollinated to set seed and insects are necessary for pollination. There are a number of insect pollinators, but the most efficient and most consistent is the alfalfa leafcutter bee (*Megachile rotundata*), which was introduced from southern Europe.

The alfalfa leafcutter bee overwinters as a pupa surrounded by dried alfalfa leaves; that is in a cocoon. Cocoons can be purchased from growers in Western Canada. Lists of alfalfa seed growers who have cocoons for sale can be obtained from Alfalfa Seed Associations in Western Canada. Before purchasing, obtain documentation of the results of the official Tests. These tests indicate the viability of the cocoons, the ratio of males to females, and the presence of parasites and diseases. Be sure to purchase only cocoons which are free of the disease chalkbrood. Since the females are the major pollinators, the cocoons are approximately 30 to 40% females.

Order cocoons early in the year, and arrange for shipment during cool weather. Store the cocoons at a temperature at or below 5°C plus or minus 2°C (36 to 42°F) at 50% relative humidity. The cocoons must be incubated at 30°C plus or minus 1°C and 70% relative humidity for 18 to 24 days before emergence. For details on incubation consult **Alfalfa Leafcutter Bee in Western Canada, Agriculture Canada Publication 1495/E**. This bulletin also provides details on the shelters which must be provided.

The leafcutter bees should not be placed in the field before the alfalfa flowers. It is important to time the emergence of these bees with the flowering of the alfalfa. The bees nest in small holes provided in nesting boards. About 50,000 cocoons per hectare (20,000 per acre) and 1 hole per bee should ensure adequate pollination and prevent drifting of the bees. Cost of alfalfa leaf cutter cells can range from 1 to 2 cents per cell, depending upon the season (supply) and the demand.

Nesting material - styrofoam boards or blocks, can be ordered (from Beaver Plastics Ltd., 12150 160 Street, Edmonton, Alberta T5V 1H5 (403) 453-5961). Shelters can be made using various designs. Their position relative to the sun is important for early emergence in the morning and a cool refuge on a hot summer's afternoon. Proper sanitation must be maintained yearly by cleaning nesting materials and shelters to prevent a serious fungal disease, Chalkbrood. Leafcutter larvae are very susceptible to this disease. Nesting material, bee shelters, equipment and storage facilities should be disinfected yearly with a weak, solution of Javex or other bleach. For more information see, **Detection of in Leafcutting Bee Cells in the Peace River Region. Publication 87-1.**

Since alfalfa leafcutter bees tend to forage near their nesting site, field shelters should be placed about 70m apart (1 shelter per acre or 2.5 shelters per hectare).

About 3 weeks after placing shelters in the field, nesting material with 75% of the holes capped can be replaced with new nesting material. This will help prevent second generation bees from emerging and provide new holes for the bees that are still foraging. The average life span of a leaf cutter bee is about 8 weeks. The removed leaf cutter cells are stored at 20°C for about 10 days to allow the immature larva to develop into the overwintering stage. Gradual cooling of the cells to 5°C will stop further development.

## **HARVESTING**

Legume seed fields can be swathed when 2/3 to 3/4 of the seed pods are dark brown to black in colour. Depending upon the weather conditions, the swaths can be threshed about a week later. Seeds will continue to ripen and cure in the swaths. If a chemical defoliant and direct combining are used, most of seed heads should be mature, since no change in seed maturity will occur.

Combine speed, wind and sieve adjustments, as well as cylinder speed are very important factors when harvesting seed. Overloading the combine or not having the machine set correctly can cause serious losses - up to 40 to 60 percent of the crop can be lost. To minimize harvesting losses, follow the manufacturer's instructions for the combine setting, take regular samples of chaff from behind the combine and make the necessary adjustments.

Further seed cleaning is necessary to bring the seed up to the standards of purity. Forage cleaning plants or companies are used for this process.

Post harvest maintenance of seed fields may be required to control weeds and volunteer alfalfa seedlings (to prevent the stand from becoming too thick) by the use of mechanical and or chemical means.

## **PEDIGREED SEED PRODUCTION**

By planting pedigreed seed, farmers can be assured that they are planting improved varieties that are genetically pure and have been bred for important factors such as yield, disease resistance, harvestability, quality etc. In Canada there are usually three classes of pedigreed forage legumes; Breeder, Foundation, and Certified.

Canadian pedigreed seed must meet two criteria prior to being granted pedigreed status.

The first criteria involves the production and inspection of the crop according to the Canadian Seed Growers' Association's Regulations and Procedures for Pedigreed Seed Production Circular 6-88. If the requirements have been met, a crop certificate is issued for the variety and class.

However, before the harvested seed can be sold with an official pedigreed seed label indicating variety, kind, class, and grade it must meet the second criteria. This involves the cleaning and grading of the seed according to the Canada Seeds Act and Regulations. This is administrated by Agriculture Canada.

Further information can be obtained from the Canadian Seed Growers' Association.

### **Other Sources of Information:**

Alfalfa leafcutter bee management in Western Canada. Communications Branch, Agriculture Canada, Ottawa. KIA OC7. Publication No. 1495/E. 1984.

Alfalfa seed production management in Manitoba. 5 years of demonstration and evaluation. Published by The Manitoba Seed Producers Association, Manitoba Agriculture, Winnipeg, Manitoba. 1984.

Alfalfa seed production in the Peace River region update 1987. Continuing Education, Fairview College, Box 3000, Fairview, Alberta TOH 1LO, Publication No. 87-2. 1987.

Alfalfa seed production in Timiskaming district. New Liskeard College of Agricultural Technology and Ontario Ministry of Agriculture and Food. 1985. Box 'G', New Liskeard, Ontario POJ 1PO.

Detection of Chalkbrood in leaf cutting bee cells in the Peace River Region. Publication 86-1. Peace River Branch, Alfalfa Seed Producers' Association Box 368, Peace River, Alberta TOH 2XO. 1986.

Detection of Chalkbrood in leafcutting bee cells in the Peace River Region 1986-87. Publication 871. Peace River Branch, Alta. Alfalfa Seed Producers' Association. Box 368, Peace River, Alta. TO 2XO. 1987.

Domestication of alfalfa leaf-cutter bees. Canada Department of Agriculture, Publication No. 1313. 1967.

Management of alfalfa for seed production in southern Alberta. Agriculture Canada Research Station, Lethbridge, Alberta. TIJ 4Bl. 1987.

**The following Publications are available from the Canadian Seed Grower's Association, Box 8455, Ottawa, Ontario K1G 3T1. Tel. (613) 236-0497. Fax (613) 563-7855.**

Regulations and Procedures for Pedigreed Crop Production. CSGA. Circular 6

Pedigreed Forage Seed Production.