Growing Meadowfoam in the Willamette Valley

Meadowfoam is a potential new crop for the poorly drained soils of the Williamette Valley. Its seeds contain 20 to 30 percent oil. Research work has been directed toward the development of a variety for commercial production as a first step in exploring its potential uses. Additional support is needed for utilization research and market development.

Meadowfoam, *Limnanthes alba,* is a low-growing winter annual native to northern California, southern Oregon, and Vancouver Island, British Columbia. The unique composition of the oil extracted from its seeds was discovered by USDA scientists in search of new sources of industrial oils. Meadowfoam seed oil contains more than 95 percent fatty acids with carbon chain lengths greater than C_{18}. These long chain fatty acids have a potential commercial market in the lubrication, polymer, and wax markets. Oil chemists believe that eventually meadowfoam oil's unique properties will be utilized, but prices, markets, and uses of the oil and meal have not yet been established.

Quoting present market prices is unreliable because market needs change. Meadowfoam oil might be valued comparably to rapeseed oil for use in a currently active market channel, but it might be worth two or three times as much if a way is found to capitalize on its unusual oil characteristics.

Why the Willamette Valley?

Meadowfoam is adapted to the poorly drained soils of the Willamette Valley currently used to produce annual ryegrass seed. Approximately 200,000 acres (80,000 hectares) of this wet land is not well suited for growing many other crops. In recent years abundant supplies have depressed the market price of annual ryegrass seed.

Field burning restrictions have limited the use of some lands for grass seed production. As an alternate crop, meadowfoam residue is sparse and low in fiber. Pulverization of plant residue during harvest leaves a clean field that does not need to be burned. In addition there is a need for crop diversity in farming operations to help spread the producer's risks and work load. The machinery required for producing meadowfoam is the same as that for grass seed. For these reasons producers probably will consider growing meadowfoam as soon as a profitable market is developed.

Choice of land

Meadowfoam will grow on most soil types found in the Willamette Valley. It is well adapted to the very poorly drained "white land," but will produce equal or higher yields on moderately well-drained silt loam soils. Sandy and/or shallow soils with low water holding capacity are less favorable because droughty conditions in early spring will cause meadowfoam to mature early and yield less.

Variety selection

A commercial meadowfoam variety should possess high yielding ability and, for mechanical recovery at harvest, it should grow at least 12 inches (30 cm) tall, with an upright growth habit and good seed retention. "Foamore" is the only named variety of meadowfoam, but the improved selection "703A" yields as well as Foamore and has much improved seed retention. This selection is being considered for release by Oregon State University's Agricultural Experiment Station as the variety "Mermaid."

Planting

A mid-October seeding usually allows completion of field operations on poorly drained soils before fall rains prevent the use of field machinery. At this time soil temperatures are low enough for good germination percentages and

Authors: Gary D. Jolliff, associate professor, Wheeler Calhoun, associate professor, Norman Goetze, Extension agronomist, and Jimmie M. Crane, research technician, Crop Science Department, Oregon State University.

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Meadowfoam grows well on soils throughout the Willamette Valley and adjacent foothill valleys.

vigorous seedling growth. Seeding rates of 30 to 40 pounds per acre (33 to 44 kg/ha) in 6-inch (15 cm) rows are recommended, but 3-inch (7.5 cm) rows provide quicker ground cover. The seedbed should have a fineness and firmness midway between that needed for wheat and alfalfa. The planting depth should be as shallow as feasible, while still covering the seed, but never deeper than 3/8 inch (1 cm). Low plant densities should be avoided because isolated plants grow in a more prostrate manner, which reduces harvesting efficiency.

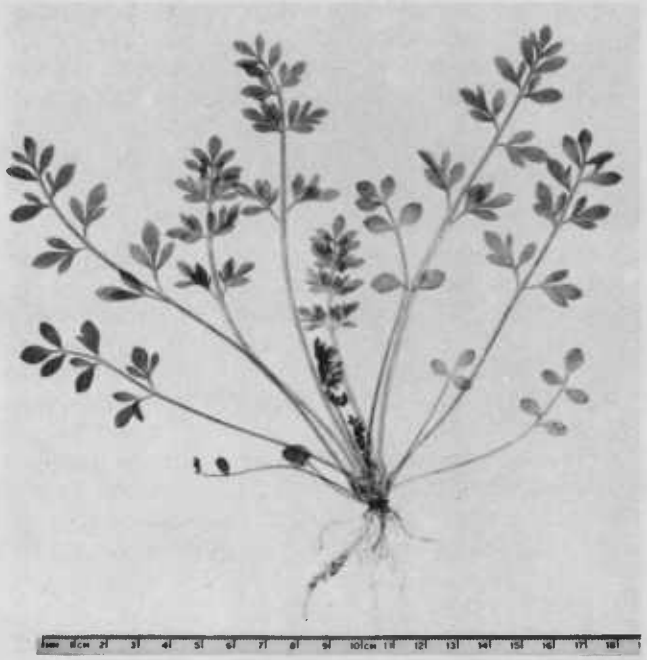
Fertilizer

Seed stands have not been improved by the application of individual nutrient elements when meadowfoam follows other crops that were properly fertilized. Further research is needed.

Weed control

Solid stands of vigorous meadowfoam provide good competition to weed seedlings during winter and spring. Most weeds that are established in the fall soon grow taller than the meadowfoam and compete severely during seed formation, thus reducing yields. They also cause problems at harvest.

No herbicides have been approved for commercial use. Two materials have worked well experimentally at OSU's Corvallis experiment station. The best broad spectrum weed control has been achieved with a preemergence application of propachlor (Ramrod or Bexton) at 4 to 6 pounds per acre (4.4 to 6.6 kg/ha). Diclofop (Hoelon) at 1 to 2 pounds per acre (1.1 to 2.2 kg/ha) has given ex-



The meadowfoam plant is relatively small in size and has a fairly shallow and fibrous root system.

Meadowfoam can be harvested with the same equipment and techniques used to harvest grass seed.

cellent selective control of volunteer annual ryegrass, applied when the meadowfoam and ryegrass are approximately 2 and 6 inches (5 and 15 cm) tall, respectively.

Pollinators

Meadowfoam requires insect pollination. One and one-half to two honey bee colonies per acre (3.3 to 4.4 colonies/ha) are essential for maximum pollination and seed set in the Willamette Valley under favorable weather conditions. Cool, wet, and windy weather; presence of other flowering plants; and the distance of bee hives from the meadowfoam dramatically limit the effectiveness of insect pollinators and will affect meadowfoam pollination and subsequent seed yield.

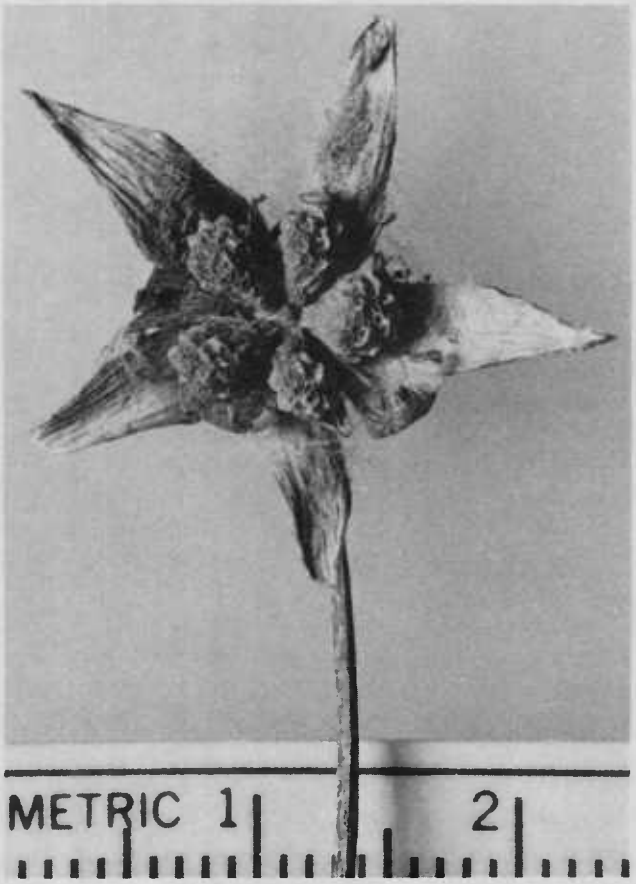
Harvest

Weed-free fields of meadowfoam selection "703A" have been combined on July 7 through July 10 at Corvallis with less than 5 percent seed loss due to shattering. Seed moisture content at harvest should be between 12 and 16 percent. Seed losses are lowest when the crop is cut with a windrower when approximately 90 percent of the seeds are mature. It can be combined, using a windrow pickup attachment, 7 to 10 days later. This system works best when green plant material from uneven ripening and weed infestations are present. Care is necessary to avoid seed shattering. Windrowing should be done while the meadowfoam stems are green and moist enough to be pliable. This operation should be performed in the early morning, when enough dew is present to prevent mature flowers from shattering. Efficient threshing is enhanced by low moisture content of the seed and plant material, high combine cylinder speed, close cylinder clearance, and fairly open sieves with high wind volumes.

Seed yields

The best yielding variety of meadowfoam developed for commercial scale production has yielded from 780 to 1,580 pounds per acre (866 to 1,756 kg/ha). While high yield is important in all crop variety improvement, emphasis in the initial stages of meadowfoam development has been placed on improved seed retention and tall, upright-growing plants that can by harvested mechanically. Significant improvements have been made in plant characteristics. Yield improvement is the next priority. There seems to be no physiological barrier to attaining seed yields of 2,500 to 3,000 pounds per acre (2,750 to 3,300 kg/ha).

There continues to be an interest in new crops for the Willamette Valley, and meadowfoam could be an economic alternative to ryegrass seed on poorly drained soils. As further research provides more information on the crop, the results will be made available through the OSU Crop Science Department, the Experiment Station, and the Extension Service.



As many as five meadowfoam seeds (nutlets) per flower are produced, and they contain 20-30 percent oil.