

Pennycress - up-and-coming low break-even cost crop for the Prairies



Agriculture is expanding beyond the traditional food and fiber production to include energy, biofuels, biomaterials and chemicals. This means new uses of existing crops or new crops have to be discovered and brought into cultivation to meet new demands. What used be plants growing where they were not wanted but turns out to possess qualities that meet the new agriculture could become crops of the future. Such a plant is pennycress (also called stink weed) *Thlaspi arvense*. Pennycress is a winter annual member of the mustard family. Pennycress has potential as an industrial oil crop. With seeds containing up to 26-31% oil by weight it can be used as a non food source of vegetable oil for biodiesel production, organic fertilizer and natural weed killer for low-acreage and high-value crop. The physical properties of pennycress oil and its methyl esters are suitable as a biodiesel.

The federal government mandate requiring an annual renewable content of two percent in diesel by 2012 is creating demand for vegetable oil for biodiesel production. Most current biodiesel processes use edible oils as the oil feedstock. To meet this demand and deal with the concerns regarding food, non-food sources of vegetable oil have to be found.

Biodiesel production depends on feedstock and land availability. The ideal crop is the one that is adapted to a particular local environment. Examples of new plants being developed around the world to meet biodiesel production include *Jatropha curcas*, (in Africa and Asia) and castor oil plant in many tropical countries. Pennycress could be our answer to jatropha in Canada. Feedstocks can account for more than seventy percent of the total cost of producing biodiesel; hence feedstock cost and availability are very important in determining the feasibility of a biodiesel industry.

Pennycress, as a field crop, present many advantages over other oil seed crops as a source of biodiesel feedstock in Canada. Nobody is growing pennycress for food at the moment. Pennycress already exists in the wild and grows in abundance throughout

Canada. It is feasible to harvest wild stands of pennycress using conventional combines. Seed yield of self seeded winter pennycress harvested in July ranged between 1980- 2560 pounds per acre with no additional fertilizer or chemical weed or pest control. Pennycress can be grown as a low input crop on marginal lands. It is very tolerant to frost, cold weather, drought and flooding. It requires no pesticides and very little, if any herbicides or cultivation. As a winter annual pennycress yields are comparable to commercial crops and offer the potential to expand. We also noted that the pennycress once established has the capacity to reseed itself. On fields where we harvested pennycress in July we had did not have to reseed for the subsequent winter crop. The pennycress seeds can be crushed by existing technology. It is anticipated the crop will be profitable to farmers and crushers.



Pennycress has a lower break-even cost than canola. The seed can be broadcast or drilled. Alberta Agriculture and Rural Development trials indicate seed rates of 6.5 pounds per acre. Yields vary depending on soils and rainfall. Pennycress averaged 2,200 to 2,500 pounds per acre from 7- to 9-inch rainfalls. It is a short duration crop. Crops seeded in July were harvested at the end of September.

The seed yield of 2870 kg/ha equates to 840 kg oil per ha or 1000 litres of oil with 2028 kg of meal per ha . The meal can be used without further processing as organic fertilizer and natural weed killer for low-acreage, high-value crops n high value horticultural crops for both conventional and organic growers and as animal feed after processing. In our experiments at Crop Diversification Centre North, Edmonton used pennycress seed meal inhibited the germination of 12 common weeds tested (white cockle, cow cockle, shepherd's-purse, wild mustard, stinkweed, scentless chamomile, green foxtail, wild oats, downy brome, lamb's-quarters, and redroot pigweed. Pennycress meal contains about four percent nitrogen, 0.70 percent phosphorus and 60 per cent organic matter organic matter. This compares with alfalfa meal with 2.6-3.6 % total nitrogen and cow manure 0.82 % total nitrogen and can be used as organic fertilizer.

Alberta Agriculture and Rural Development in collaboration with All Peace Industries, Olds College, Lesser Slave Lake Economic Alliance and Peace Region Economic Development Alliance are laying the foundation for the cultivation, processing and commercialization of pennycress in Alberta. It is projected that about 200 growers will be required to cultivate 100,000 acres of pennycress to produce 24 million litres of biodiesel per year from 2012 onwards. We have obtained a non weed status for pennycress thus paving the way for its cultivation as a crop in Alberta. Growing pennycress as crop will require the same attention to production issues - rotation, pest management etc as food crops.



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