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B R I E F I N G

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Feedstock Requirements for Large Scale 100 Million Gallon Biodiesel Production Facilities in Montana

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Objective Analysis for Informed

Two separate private companies have recently announced preliminary plans to construct large scale biodiesel production facilities in Montana, each with an annual production capacity of 100 million gallons. Both companies expect camelina to be their major feedstock. This briefing examines the feedstock requirements for plants of this size and implications for agricultural land use in Montana if all of these requirements are to be met by in-state production.

Camelina Feed Stocks

Over the past five years, research into camelina varieties and camelina production has substantially expanded information about camelina production in Montana. Nevertheless, camelina is still a new crop in Montana and much additional research is required before several important issues can be resolved. These include the effects of different soil and weather conditions on camelina yields and camelina oil content.

A recent MontGuide on camelina production (authored by Kent McVay) reports yields ranging from 330 to 1,700 pounds per acre and oil content ranging from 29 to 40 percent. Other data suggest that average yields obtained using existing varieties range from 1100 to 1300 pounds per acre on summer fallow acres. These are wide ranges and include camelina crops grown using existing varieties under ideal weather conditions as well under drought. While new varieties of camelina are being developed, it seems unlikely that average yields would increase by more than 25 percent over the next one to three years or that oil content would exceed 40 percent.

On this basis, estimates of the total acres that would have to be planted to camelina annually to provide sufficient camelina feedstocks to support a single 100 million gallon biodiesel plant have been developed under a range of assumptions about average yields and average oil content. These estimates are reported in table 1.

Table 1: Annual Camelina Planted Area Required to Supply Feedstocks for a 100 Million Gallon Biodiesel Production Facility

Per Acre Yields (pounds)	Oil Content		
	32%	36%	40%
900	2,604,167 acres	2,314,815 acres	2,083,333 acres
1200	1,953,125 acres	1,736,111 acres	1,562,500 acres
1500	1,562,500 acres	1,388,889 acres	1,250,000 acres

High yields and high oil content imply that relatively fewer acres are needed for feedstock production. If the average yield and oilseed content (1,500 per acre and 40% oil content) and solvent-based extraction technology is used, then 1.25 million acres would have to be planted to camelina annually to supply a 100 million gallon facility. If mechanical extraction technology is used, only 60 to 80 percent of the oil would be recovered and, correspondingly, substantially more acres would have to be planted to camelina to supply a 100 million gallon plant with sufficient feedstocks.

Lower average yields and lower oil content would also require more land for camelina production. For example, in the "worst case" scenario considered in Table 1 where the average yield is 900 pounds per acre and oil content is 32 percent, 2.6 million acres would have to be planted annually to camelina. In a "middle case" scenario, where the average yield is 1,100 pounds per acre and oil content is 36 percent, 1.736 million acres would have to be planted to provide the required feedstocks.

Table 2: Estimated Planted Acres in Montana by Crop in 2007

Crop	Planted Acres
Wheat (all)	5,170,000
All Hay	2,550,000
Barley	900,000
Dry Peas	230,000
Lentils	87,000
Oats	75,000
Corn	70,000
Safflower	53,000
Sugar Beets	48,500
Flax	30,000
Austrian Winter Peas	20,000
Dry Beans	18,000
Alfalfa Seed	10,700
Potatoes	10,600
Canola	8,000
Mustard	7,000
Sunflower	3,600*
Sweet Cherries	750*
Total	**9,287,800**

* The planted acres reported for sunflowers and sweet cherries are estimates based on 2006 planted acres for these crops.

Other Issues

Over 500,000 tons of camelina meal would also be produced annually. Although camelina meal is a potentially marketable product, the FDA has not yet given approval for its use as an animal feed.

Another issue is the lack of federal crop insurance for camelina. Efforts are underway to resolve these issues but these issues have not been resolved at this time.

A third issue concerns systematic regional crop production risk. In Montana, there is systemic variability in statewide annual average yields for dryland crops such as camelina and wheat. State wide average yields for dryland crops vary because major growing regions within the state are subject to similar weather conditions, and drought, pest infestations, and disease infestations are relatively frequent occurrences. A 100 million gallon biodiesel production facility, therefore, may have to contract for additional camelina acres and/or hold substantial feedstocks to offset these production risks. Alternatively, the plant could manage this type of risk by sourcing camelina from other states or from Canada.

Available Crop Production Acres

Planting between 1.2 and 2.6 million acres to a new crop would require substantial reduction in the acres planted to other crops. In 2007, the total acreage planted to all crops in Montana - including wheat, barley and hay - is estimated by USDA NASS to have been about 9.3 million acres. Estimates by crop are presented in Table 2.

A key issue for large scale biodiesel production concerns the incentives for Montana producers to shift between 12 % and 25% of total planted acres in Montana into camelina production. The expected profitability of camelina as compared to other competing crops is a major factor in a producer's planting decision.

The lack of federal crop insurance, lack of FDA approval for camelina meal as an animal feed, and current high prices for crops such as wheat and barley are substantial obstacles to the development of a 100 million gallon biodiesel facility based on Montana camelina production.