

INTRODUCTION

- The U.S. imports over 60% of the oil used in gasoline and diesel production.
- Annual diesel sales average 43 billion gallons. Fuel oil/kerosene is 57 billion gal.
- Biodiesel is an EPA approved renewable fuel that can be produced either from regionally farmed oil seed crops or from recycled vegetable and animal fats.
- Current national production of biodiesel is estimated at 15-20 million gal/year.
- Pacific Northwest biodiesel production has the potential for assisting rural and farm development, aiding our national security through increased reliance on domestic renewable energy.
- Development of biodiesel crushing and processing plants within the region could effectively add to state and, in particular, rural and farm economies by utilizing area commodities through the creation of a new job related infrastructure.
- USDA estimates that 17,000 jobs are created for every billion gallons of biofuel produced. Other studies concluded that 100 million gallons of biodiesel production could generate an estimated \$8.34 million increase in personal income.

OBJECTIVE: To quantify the environmental and economic benefits of incorporating a sustainable oil-seed biofuel crops in irrigated vegetable rotations.

To determine: 1) the energy balance (input-output balance for petrochemicals vs biodiesel yield;
2) the C balance, trace gas emissions (N₂O, CH₄ and CO₂) and nutrient budgets and;
3) production sustainability and profitability.

Table 1. Oil Producing Crops.

Plant	Yield (seed) lbs/acre	Biodiesel gal/ acre	Plant	Yield (seed) lbs/acre	Biodiesel gal/ acre
Corn	7800	18	Safflower	1500	83
Oats	3600	23	Rice	6600	88
Cotton	1000	35	Sunflower	1200	100
Soybean	2000	48	Peanut	2800	113
Mustard	1400	61	Rapeseed	2000	127
Camelina	1500	62	Coconut**	3600	287
Crambe	1000	65	Oil palm**	6251	635

** Yield given in lbs of oil /acre.

OILSEED CROPS

Cruciferae family			Cruciferae family		
RAPESEED AND CANOLA (<i>Brassica napus</i> or <i>B. campestris</i>)			MUSTARD AND CRAMBE (<i>Sinapsis alba</i> / <i>Crambe abyssinica</i>)		
	Range			Range	
	Erucic acid % in oil	Glucosinolate μmole in g oilfree meal		Erucic acid % in oil	Glucosinolate μmole in g oilfree meal
RAPSEED	2 to 55	>30	MUSTARD	>2	>30
	<2	>30	CRAMBE	40 to 50	>30
	>2	<30			
CANOLA	<2	<30			
	Range			Range	
	Yield Lbs/ac	Oil Content %		Yield Lbs/ac	Oil Content %
Planting date	Spring Type Mid Apr - Mid May	Winter Type Late Aug - Mid Sep	MUSTARD	1500 - 1800	25 - 27
Bloom	30 to 45 dap†	Mid to Late Apr	CRAMBE	1500 - 2000	28 - 30
Harvest	110 - 120 dap	300 - 310 dap			
Yield (lbs/a)	2000 - 2500	4000 - 4500			
Oil content	40-45 %	40 - 45 %			
Compositae			Leguminosae		
SAFFLOWER (<i>Carthamus tinctorius</i>)			SOYBEAN (<i>Glycine max</i>)		
Planted:	Early Spring		Planted:	Late Spring (to avoid frost damage/kill)	
Growing season:	150 - 160 dap		Growing season:	140 to 150 dap	
Yield:	3500 - 4000 lb/a (85 - 100 bu/a)		Yield:	3000 - 3500 lbs/a (50 to 60 bu/a)	
Oil content:	42 - 48 %		Oil content:	20 - 22 %	

†dap: days after planting.



Crambe



Rapeseed



Mustard



Safflower



Sunflowers



Soybean