Canola as a Rotational Crop in a Washington Cropping System

An N. Hang
Washington State University - IAREC

INTRODUCTION

Washington produces excellent crops of wheat, barley, bean and potatoes. However, growers are facing with low profits in some years and problems associated with mono culture and limited usages of synthetic pesticides. Potato growers are facing problems associated with the loss and/or restricted use of available chemicals. Grain growers are also facing with similar problems as well as weeds, insects and diseases. Control of these pests are heavily dependent on costly and toxic pesticides. Growers are looking for crop(s) to fit in their rotations and crop sequences to break the pest cycles and to minimize synthetic chemical usages. Because of health and environmental impacts, the continued availability of agricultural chemicals is a major concerns to growers. Consequently, the search for best management practices and alternative measurement to manage weeds, insects and pathogens on the crops as well as maintaining soil sustainability has become increasingly important.

Canola is relatively new to Washington growers. It raises more concerns to farmers who do not have experience with such crop. Recently, the positive effect of canola has been outranked their concerns. It is a great alternative rotational crop, breaking weed, insect and disease cycles. Deep root of canola improves soil tilth, and increases the efficiency of water and fertilizer usages by growing crop itself or by succeeding crops. Canola is not a host of or susceptible to Russian wheat aphid, Hessian fly and certain wheat diseases such as take-all (*Gaunmanomyces graminis)* and eyespot

(Pseudocerospoelle hepetricoides), thus reducing the levels of these diseases in a subsequent wheat crop. Canola is not a carrier of nematode that makes it an excellent alternative rotational crop for wheat and potato. Canola volunteers are easy to control using the broad leaf herbicides which were used to control weeds in commercial wheat production. In grain crops or potato mono culture, certain weed species are resistant to herbicides after repeating applications for many years. It makes weed control a tough and expensive job for growers. Crop rotation using species other than traditional crops are needed to remain competitive white producing high quality products.

RESEARCH OBJECTIVES

In general, the goal of this study is to define the positive and negative impacts of canola on traditional crops in irrigated central Washington. The specific objectives are:

* Study crop rotation, crop sequence and/or combination, and identify which will be economically sound for Washington growers.
* Define problems associated with canola in the rotation schemes of irrigated central Washington.
* Develop best management practice for crop rotation under irrigation.

MATERIALS AND METHODS

First year experiment was conducted on a Warden loam soil (coarse, silty, mixed, mesic Xerollic Camborthids) at Roza Research Farm of Washington State University Irrigated Agriculture Research and Extension center at Prosser. Experiment consisted of 5 crop species as main plot and crop sequences as subplot. Plot layout is in Table 1. In 1993-1994 cropping season, the field was previously seeded with winter canola, green

manure canola - potato and wheat. Soil samples were taken before seedbed preparation and fertilizers were adjusted to levels recommended for these crops in this area (Table 2). Selected chemical herbicides were sprayed to control weeds in all plots before planting or before crop emergence or before booting stage of wheat. Irrigation water was applied uniformly before seedbed preparation and during crop growth to assure optimum crop growth and development (Table 3). Crop variety, seeding rates, planting and harvesting dates are in Table 4. Potato plots were sprayed several time with carbaryl (Sevin) to control Colorado potato beetles and zineb (Dithane) and metalaxyl (Ridomil) for blight control. Crops were harvested at maturity for yields, seed moisture and quality. Yields of potatoes were recorded for total and US No. 1 tubers. Ten tubers from each plot were cut into halves to check for internal brown spot and/or nematode infestation.

RESULTS AND DISCUSSION

Yield data for this first year study is in Table 5. Yield variation was due to the variation among blocks rather than the differences in treatments. Potato yield in this study was lower than average yield in the area due to the cool and wet spring and late in the summer. There were no hollow hearts or brown spots observed as well as the incidence of nematode infestation in these potatoes. Soil samples were again taken in November after all the crops harvested. This information will be taken into account before planting next spring. There were no infestation of insects or diseases on canola, corn, bean or wheat. The only problem was bird damage on canola crop. This may be a new topic for future research on canola.

Table 1. Treatment layout for first and second year crops.

Block I		Block II		Block III		Block IV	
1st year	2nd year	1st year	2nd year	1st year	2nd year	1st year	2nd year
Wheat	Corn	Bean	Corn	Bean	Potato	Corn	Bean
Corn	Wheat	Potato	Bean	Canola	Corn	Wheat	Canola
Potato	Canola	Corn	Canola	Wheat	Bean	Canola	Potato
Bean	Wheat	Wheat	Potato	Corn	Potato	Bean	Canola
Canola	Bean	Canola	Wheat	Potato	Wheat	Potato	Corn

Table 2. Basic fertilizer applications (in lb/A) for each crop species grown in the area.

Crop species	Nitrogen (N)	Phosphorus (P)	Potassium (K)*	Zinc	Sulfur
Bean	100	80	0	10	0
Corn	200	44	0	0	0
Potato	250	44	125	0	0
Spring canola	150	22	0	0	30
Spring wheat	150	22	0	0	0

* Soil test showed adequate potassium for optimum growth therefore no K was added to the soil.

Table 3. Rate of herbicide applications to crops in 1995.

Crop species	Herbicide	Rate
Bean	Ethalfluralin and EPTC	1 qt/A + 2 qt/A
Corn	Metolachlor	1 qt/A
Potato	Metolachlor + Metribuzin	1.5 pt + 0.75 pt/A
Canola	Trifluralin	1 pt/A
Wheat	2,4-D	1.5 pt/A

Table 4. Cultivar, seeding rate/plant population and/or spacing, planting and harvesting dates in 1995.

Crop species	Cultivar	Seeding rate/ plant population	Planting date	Harvest date
Bean	Othello	3" by 22"	May 16, 95	Aug 31, 95
Field corn	NK 4242	30,000 plants/A	May 12, 95	Oct 24, 95
Potato	Russet Burbank	2,000 lb/A	April 18, 95	Oct 5, 95
Spring canola	Tobin	6 lb/A	April 14, 95	July 31, 95
Spring wheat	Pennwawa	120 lb/A	April 17, 95	Aug 28, 95

Table 5. Yields in lb/A of canola, corn, bean, potato and wheat in each rotation block. 1995.

Crop species	Block 1	Block II	Block III	Block IV	Mean	SD
Canola	1958	2080	2351	1824	2053.25	194.29
Corn	13,802	12,785	13,197	11,507	12,556.8	881.72
Bean	2,937	2,883	3,257	2,317	2,848.50	338.52
Wheat	5,400	5,888	6,823	4,309	5,605.00	906.26
Potato - total US no. 1	47,446 45,077	42,210 38,176	48,087 43,271	37,725 33,855	43,867.0 40,094.7	4,215.6 4,402.5

SD: Standard deviation
Value in each block is the average of 4 replications.