

Oilseed Production Case Studies

in the Eastern Washington High Rainfall Zone

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Introduction

The higher rainfall areas of eastern Washington that make up the study area (Region 1; see Fig. 1) are characterized by the rolling hills and rich, productive soils of the Palouse, where wheat-based annual cropping rotations have been the traditional system for many years. The region encompasses 1,571,669 acres of cropland ranging from 1,500 feet to 3,000 feet above sea level. Soils are medium-textured silt loams. Seventy percent of the precipitation occurs from November to March. Slopes range from nearly flat to 55 percent, making conservation farming and

residue management an imperative for preserving the soil resource. Frost-free days range from 120 to 160 days; soils are sometimes frozen in the winter to a 6-inch depth for 30 days or more.

Many farms here were established over 100 years ago, when plowing and planting wheat every year was the accepted practice. Now, reduced tillage and direct seed is becoming more widespread, and spring crops in rotation with winter wheat is encouraged, but legumes are only grown on less than 10% of the acreage, and oilseeds less than one percent of the region. With an annual precipitation of 15–25

Washington Croplands

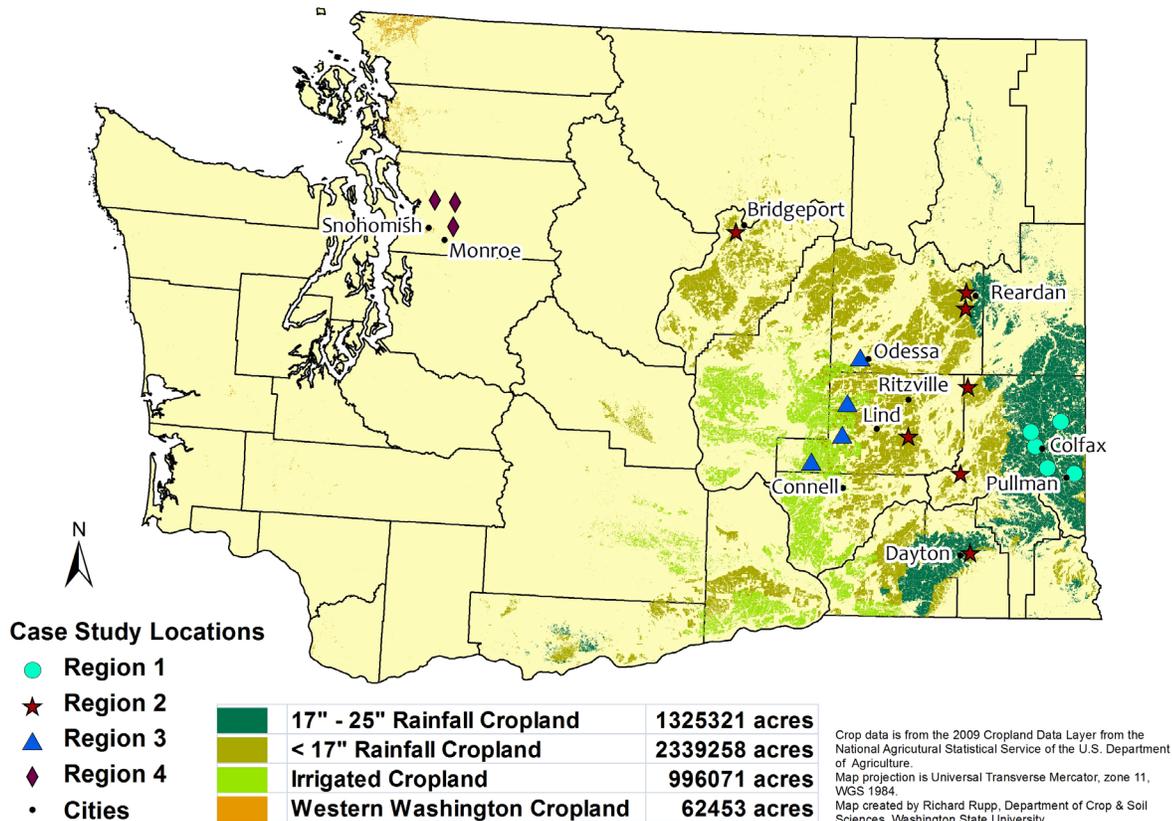


Figure 1. The five producers featured in Region 1 (pale blue circles on map which are linked to the respective case studies) grow oilseed crops in the 17-25 inch rainfall zone of eastern Washington.

inches, there is adequate moisture most years to support more diverse rotations ranging from annual cropping to fallowing every third year.

The following five case studies reveal how five growers in the Palouse got started in oilseed crop production, the details of their agronomic practices, how they go about making marketing decisions,

challenges and successes they have experienced along the way, and advice they have for fellow producers who may be interested in trying oilseeds for the first time. Five experienced oilseed growers in this region of eastern Washington are featured Tom Conrad, Colfax; Lee Druffel, Colton; John Hinnenkamp, Colfax; Rich Olson, Garfield; and Del and Steve Teade, Colfax.

Tom Conrad Farm Colfax

Tom Conrad farms 1,200 acres southwest of Colfax in an 18–19-inch rainfall zone with predominantly Palouse silt loam soils. He is a second generation farmer, following his father on the farm. Like many other producers in the western, drier edge of this region, winter wheat, spring grain crops, and chemical fallow comprised the majority of Tom’s rotation until he took a closer look at other options. “We were looking for something to provide more income on that chemical fallow ground, so we started growing canola about 10 years ago,” he recalled. Tom currently manages a three-year rotation of winter wheat, spring barley, and spring canola (Fig. 2). This includes a Roundup Ready® canola variety on about 300 acres. “Having Roundup Ready canola available provides a competitive weed control advantage for us over only chemical fallow,” Tom said. “I’ll keep growing spring canola, unless the price goes down to 10 cents.”

Agronomics

To prepare for a spring canola crop, Tom applies fertilizer in the fall prior to spring planting. “I do this for my other spring crops as well. It is a timing factor, particularly when it can easily be too wet, or even frozen, to get in the field in early spring,” he explained. Fertilizer rates have averaged 90–115 lbs N/acre, and 15 lbs S/acre. Before planting in the spring Tom sprays the field with 16 ounces/A of Roundup. Tillage involves a two-pass system, with fertilizing in the fall and seeding in the spring.



Figure 2. For over 10 years, Tom Conrad has successfully grown spring canola in place of chemical fallow in a 3-year rotation.

To plant the canola, Tom uses a 535-hp Case IH Quadtrac™ that pulls a 30-foot wide Case IH 5500 drill equipped with a modified fluted feed (Fig. 3). Fifty-two openers are on slightly less than 7-inch centers and the seed is placed about one inch deep at a rate of 3–4 lbs/acre. “Originally the flute was just pushed left or right by hand, without an accurate measure of how far it was moved. I added a screw and locknut, so by turning the screw clockwise the seed flow is reduced, while turning it counterclockwise pushes the flute and increases the seed flow. With the small seed size of canola, the modifications I made help meter the seed more accurately,” Tom explained.

“We use Helix XTra® every year for seed treatment to avoid seed and soil diseases and flea beetle problems,” he continued. Once the crop is up and growing he applies Roundup again at a rate of 14 ounces. The primary weed pressure is from wild oats. Some years a heavy flush of wild oats affects the canola before the Roundup takes effect. For



Figure 3. By modifying the fluted feed on his drill, Tom is able to achieve more accurate seed metering and placement.

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—Tom Conrad

in-season pest control, Tom said “each year I spray spring canola at the end of flowering with zeta-cypermethrin (Mustang®) or bifenthrin (Capture®), primarily for cabbage seedpod weevil.” Tom direct-harvests the canola with a 30-foot CaseIH model 2188 combine; adjustments include closing the sieves most of the way, slowing the rotor, and opening the concaves to reduce seed loss as much as possible. His average yield during the past 10 crop years has been 1,900 lbs/acre. Yields in 2008 varied widely, from 1,200 to 1,700 lbs/acre, which Tom attributed to the weather. “You could see from the top of the hill that the frost took the bottomlands and the heat took the top part of the hills,” he explained. Tom had no canola in 2009 due to USDA Farm Program restrictions, but he seeded one-third of his farm to canola again in 2010. Despite continued unusual weather patterns in 2010, his canola yielded 1,700 lbs/acre. “The new variety (DKL 30-42) I grew this year withstood high winds, so it appears to be shatter resistant.” After harvest, Tom leaves the canola stubble untouched until fall when he applies fertilizer and direct seeds the winter wheat crop. “Having that canola stubble there during the winter really helps with snow capture and protecting the wheat crop,” Tom said.

Marketing

Tom transported his 2008 canola crop to Pacific Northwest Grain Growers in nearby Colfax for storage, and then had it hauled to Inland Empire Oilseeds in Odessa for a 1 cent per pound premium. He is hoping that an eastern Washington facility such as the one in Odessa will improve the price for canola because it can be processed in the area rather than Lethbridge, Alberta. “I delivered this year’s crop to a PNW Cooperative at Colfax (Fig. 4), and they have mostly delivered it to Canada.” Even though Tom has not dealt directly with canola

Fall Fertilization Distributes N in the Root Zone for Spring Crop Uptake

Fall nitrogen (N) fertilization for spring crops can help even out the seasonal work load for farmers, and it also increases the potential for N to be available in the root zone throughout the growing season. Research over several years on Curtis Hennings’ farm near Ralston demonstrated fall N fertilization for spring wheat effectively delivered N when and where it was needed.

How, when, and where does it work?

Deep rooted spring crops such as wheat and canola extend roots and extract water to depths of 3–4 feet. For spring wheat, Pan et al. (2001) demonstrated that it was desirable to build plant-available N in the first, second and third feet of the root profile with a fall N fertilizer application. By applying urea-ammonium nitrate in early October, the nitrate moves with the infiltrating water from fall rains, while the urea and ammonium stay in place until they transform by microbial action to nitrate. Since this process is microbially mediated, it depends on water and warm temperatures (>55°F soil). As a result, some of the ammonium stays in the surface soil all winter, and the remainder nitrifies over time, leaching deeper into the root profile. Timed correctly, this evenly distributes N within the top 3 feet of soil by the time the spring crop’s root system is ready to take up fertilizer:

Fall fertilization for spring crops works best in the intermediate rainfall zone (12–18”/year) where there is typically insufficient rainfall to leach the bulk of N below the root zone. In higher rainfall zones, there is increased likelihood that fall-applied fertilizer will leach below the root zone before the crop can utilize it.

Reference

Pan, W.L., F.L. Young, and K.K. Kidwell. 2001. Carbon and Nitrogen Cycling in Direct-seeded Spring Cereal Alternatives to Summer Fallow. In B. Brown, ed. *Proceedings of the Western Nutrient Management Conference 4*: 202-209. Potash and Phosphate Institute, Brookings, SD.

meal, he is quick to note that for livestock feed it has “tremendous value. I would like to see research focused on increasing oil content, which can be a valuable factor when marketing the crop for its end-use, whether it be for human consumption, biodiesel, or the meal,” Tom continued.



Figure 4. Although Tom has considered on-farm storage for his canola, so far he still delivers it to local elevators directly from the field.

Challenges

“Our biggest challenge is trying to get in early enough in the spring (no later than May 1) when there is still frost. We usually lose some canola to frost 1 in 4 years,” Tom commented. He also mentioned that volunteer canola can be a problem, especially when there is a warm spring. In 2008, Tom observed “unusual shattering;” rather than the seed shattering from the pod, the whole pod fell off the plant before and during harvest. “The pods covered the ground, and we’re still not sure what caused that,” Tom remarked. This year the canola leaned over at about a 45 degree angle, so he had to run the header nearly on the ground to harvest all the pods.

Successes

One of the positive results from growing canola that Tom has observed is improved soil structure. “We switched to a 2-pass tillage system of fertilizing and seeding when we started growing canola, so I



Figure 5. Increased wheat yields, improved soil tilth, and far better weed control using Roundup Ready canola outweigh minor issues such as adjusting harvesting height due to the crop leaning over in 2010.

can’t be sure if it is one or the other, or both, but we sure notice a difference.” Tom also mentioned that despite the canola not looking all that good sometimes, it always turns out okay. In Tom’s experience, an important advantage is higher wheat yields following canola compared to wheat in rotation with other broadleaf crops (Fig. 5). “I think we can attribute that to the broad spectrum weed control with Roundup in the canola every third year,” Tom said. “It benefits my next crops through better weed control than in-crop sprays. Another benefit of Roundup in the rotation over other weed control products is that it does not remain in the soil. The Roundup provides a break in the herbicide groups,” Tom explained.

Advice to other growers

The first suggestion Tom has for growers interested in trying an oilseed crop is to “know your chemical history. You’ve got to know where it’s safe to plant the crop without damage from previous chemical applications,” he explained. He has also had the best luck planting the canola as early in the spring as possible, before drilling spring grains. “We like to use short, early maturing varieties so the crop is easier to get through the combine and it’s harvested in plenty of time before we need to drill winter wheat,” Tom said. After a decade of growing canola, Tom stated with confidence that “I believe my winter wheat overall is better following spring canola compared to following chem fallow.”

Lee, Joanne, and Allen Druffel Bar Star Farm, Colton



Figure 6. Lee and Joanne Druffel are well known for their sustainable farming methods, and oilseed crops have had a place on their farm for 30 years.

The Druffel family—Lee, Joanne, and son Allen—farm 3,000 acres south of Colton near the area Lee’s great grandfather settled in 1872. The Druffels direct seed 100 percent of Bar Star Farm, which is predominantly Athena and Palouse silt loams over varying terrain. Annual rainfall ranges from 15 to 20”. Lee is a strong believer in sustainable agriculture and has been growing oilseed crops for nearly 30 years, including mustard, rapeseed, canola, safflower, sunflowers, and flax (Fig. 6). “We chose to grow oilseeds for rotation purposes, and to add diversity to our crop choices,” Lee said. “There is no doubt from the perspective of soil health that an oilseed crop does something to the ground that’s good,” he added. A rotation that includes an oilseed may be winter wheat-winter wheat- spring brassica. “More recently we’ve concentrated on mustard in place of spring grain in my rotation with winter wheat, growing about 100–200 acres each year—it’s a great part of the rotation!”

Agronomics

Mustard: “We base our yield goal on gross return. When the market is less than \$0.15, it doesn’t pay to produce mustard. In 2008 we were able to contract for \$0.48, which was an excellent price, and even the \$0.32 we got in 2009 was pretty good,” Lee related. He likes to plant mustard as early as possible in March, which can be challenging in a direct seed

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—Lee Druffel

system. “It’s one of the first crops in the ground. However, with the shallow seeding depth, we won’t mud it in or plant when the soil is too cold, as the mustard can’t penetrate much of a crust. Mustard is not like wheat, it’s a one-shot deal,” explained Lee. His seeding rate is 8–10 lbs/acre, with a 10 ½” row spacing using a Seedhawk shank drill for the one-pass operation (Fig. 7). Lee fertilizes the mustard at rates similar to spring barley, which he bands 1 ½” under the seed. Average fertilizer rates are 80–100 pounds of nitrogen, 10 pounds or less of phosphorus, and 20 pounds of sulfur. Jointed goatgrass is a “major problem” in several areas of the Bar Star Farm, and Lee thinks Clearfield® technology (imidazolinone [IMI]-resistant mustard) will likely be necessary to combat it. “An IMI-resistant fall brassica crop would fit best in our system,” he said.



Figure 7. The Druffels use a Seedhawk drill to plant mustard and rapeseed (photo courtesy of Lee Druffel).

As far as any insect pests, Lee said “the cool thing about mustard is nothing eats it!” Elk can be a minor problem just walking through the field or lying down in it. Because Lee farms in an area known to have high winds, he applies a pod sealant prior to harvest to minimize pod shattering. “By using pod sealant I can let the brassica crops sit until I can get to them after my other crops,” Lee said. He harvests with a Case IH rotary combine with flex heads. Yields average 1,200–1,300 lbs/acre, with a high in 2009 of 1,650 lbs/acre.

Fall rapeseed: Although Lee has grown fall rapeseed several times, he said there just isn’t enough fall moisture for seed establishment following another crop. “I need to fallow for enough moisture, so that’s what I did in 2009 on 200 acres, and I planted earlier than I usually would,” he explained. Planted in late July at a depth of 2 ½” with the Seedhawk drill at a seeding rate of 10 lbs/acre, the rapeseed emerged in 6 days. After soil testing and finding fairly high nitrate levels, Lee decided not only to lower nitrogen rates, but to use natural soil amendments as he has on several of his fields over the years. “For the rapeseed we cut back to 25 pounds of nitrogen (as aqua ammonia) and 10 pounds of sulfur. We also use an enzyme that promotes nitrogen mineralization, thus reducing the potential for leaching of nitrates. I feel that active, healthy soil biology makes the plant more resistant to root or foliar problems.” Lee also uses an insecticide at planting primarily for flea beetle control. He has a yield goal of 2,000 lbs/acre for the rapeseed crop. Before harvesting mustard or rapeseed, he inspects the combine for any cracks that may result in seed loss. “I reduce the wind, raise the reel, and take my time harvesting oilseed crops,” Lee said. “I have had difficulty at times getting mustard to feed, but I see good potential for newer combines with draper headers that might help that problem.”

For several years, Lee crushed mustard seed and produced mustard meal and oil (Fig. 8). “We as farmers need knowledge about biodiesel—how to produce it and how to use it, but that is also a personal choice depending on a particular farmer’s needs and interests,” Lee said. “I have grown the oilseed crops and crushed the seed, and I sold the oil to someone nearby who was already making biodiesel. Although I have not made biodiesel myself, I’ve used a blend from the pump in my equipment and it performed well for me. I like having an alternative fuel source.”

Marketing

Economics play a major part in deciding whether or not to plant an oilseed crop. For spring brassicas,



Figure 8. Lee ran a crusher for several years that produced oilseed meal and oil from the seed.

Lee chooses to contract the crop in the spring when the decision is made to plant. “In my opinion it’s too volatile a market to go on your own,” he said. “What I grow depends on the markets that year.” He markets his mustard for condiment use through McKay Seed of Moses Lake, although Lee admits “that is a long truck drive to deliver stuff!” He contracted with George Brocke & Sons of Kendrick, Idaho, for his 2009 rapeseed crop.

Challenges

The main challenge in growing oilseed crops at Bar Star Farm is herbicide carryover. “If I didn’t have myself in such a chemical box, I would probably start rotating even more. We’ve got real issues with jointed goatgrass on a lot of the ground I farm. Some of it we inherited and some of it we probably did to ourselves. The only way I see we can control the jointed goatgrass and still grow a fall wheat crop is with Clearfield technology, yet we can’t grow mustard where we plant Clearfield because of using Beyond™. We’ve seen detrimental effects (from chemical carryover) well after the posted tolerance on the label. I realize moisture and weather can affect that, but it sure makes things difficult!” Another challenge is the proximity to an oilseed processor. “The brassica industry is so segmented. Lately

Know Your Chemical Application History Before Planting Oilseeds

Joe Yenish, former WSU Extension Weed Specialist

Herbicides applied in cereal grain or grain legume crops often have plantback restrictions for brassica crops. Plantback restrictions following an herbicide application are the periods during which a crop cannot be planted without the danger of crop injury. Normally, plantback restrictions are stated as days or months. Group 2 herbicides are the main group of concern for extended plantback restrictions prior to planting canola. These herbicides include chemicals from the imidazolinone, sulfonylurea, sulfonylamino-triazolinones, and triazolopyrimidines structural groups. Most of the labels requiring a bioassay before planting brassica crops provide little procedural detail.

Check http://css.wsu.edu/weedscience/reports/canola_plantback_restrictions.pdf for detailed information about herbicides and their labeled plantback restrictions for canola and yellow mustard. See Extension Bulletin PNW571, *Plantback Restrictions for Herbicides Used in the Dryland Wheat Production Areas of the Pacific Northwest* [<http://www.cals.uidaho.edu/edComm/pdf/PNW/PNW0571.pdf>], for a comprehensive list. The majority of labels list specific plantback intervals for canola, a few list intervals for mustard, but very few make any mention of camelina. It is likely more labels will address camelina and other oilseed crops if they become more commonly grown.

we've been able to haul our mustard to Genesee, but before that it was either Moses Lake or Great Falls, Montana. It would be helpful to have more options for hauling our harvested crop to someplace reasonably close to our farm." Shattering and timely harvest are issues for all the oilseed crops, but the use of pod sealant has helped with those issues. Lee also mentioned that mustard and other oilseed crops are high water use plants.



Figure 9. Like an oilseed crop progressing towards a successful harvest, networking with growers about oilseed crops can help a first-time grower be successful as well (photos courtesy of Lee Druffel).

Successes

When questioned about any successes over the years growing brassicas, Lee responded "Oilseeds provide an alternative crop, an *opportunity* crop, for us to place in our rotation. There is a financial benefit if the price is good and we have a field available without chemical carryover. More than that, though, the soil health is so improved after an oilseed crop. The soil is mellow, and the roots will break through the hardpan at 16–18 inches—now that's a darned good subsoiler! Fall rape in particular has roots that must go deeper and farther, because when we're soil sampling in a field that had rape, the probe goes in so easily." Lee couldn't put a number on yield increases in crops following oilseeds, but did say it was "significant," and added that the second year of winter wheat following mustard had an even better yield—a "delayed benefit."

Advice to other growers

"Start small! Everyone has a different level of what they'll put up with growing any crop, and you've got to find out if you want to deal with those things if you choose to grow oilseeds," Lee said. He continued by encouraging trying mustard first, as it is easy to grow, has fewer pests, and always has a ready market. "I would also suggest trying a pod sealant before harvest—that will resist shatter, which makes harvest *much* easier. In my experience, pod sealant overall is well paid for, and allows the crop to sit longer if needed." As far as marketing oilseed crops goes, Lee said that it is "a continuous decision, and you need to be really flexible; it depends on the markets, weather, and other factors. Will I continue growing oilseed crops? Definitely yes, and like I mentioned earlier, if I didn't have myself in such a chemical box, I would probably start rotating more with oilseeds." One last thing to remember: "We know a whole lot of what *not* to do! Talking to other growers who have tried these crops is helpful as we work towards learning more about what does work (Fig. 9)."

John Hinnenkamp Colfax



Figure 10. John Hinnenkamp has grown spring canola for 14 years in the Colfax area.

John Hinnenkamp is a fourth generation producer who farms predominantly Palouse silt loam soils near Colfax, including a couple of fields adjacent to Highway 195 south of Colfax (Fig. 10). “About 14 years ago we were talking about chemical rotations and the low price of peas with a chemical company representative, and he mentioned Roundup Ready canola as a crop to try. That gave us another mode of action on our wild oats and other tough weeds, as well as disease problems,” John recalled. Despite annual rainfall of 20–21 inches, the fall is typically too dry to get any winter brassicas established. “It can be the same thing in the spring—if we don’t have moisture it’s not going to work, but fortunately we’ve always had enough moisture to plant spring canola,” John explained. By working spring canola into his regular rotation, John has not had to summer fallow for 5 years. “We really like the fact that we didn’t have to make any equipment changes by choosing to grow canola,” John said. He never imagined when he first planted spring canola 13 years ago just how much attention a flowering canola field could get. “It sure is a beautiful crop in full bloom, but you wouldn’t believe how many people pull over along the highway to take pictures of it!” John commented.

Agronomics

Prior to growing canola, John had either a two-year rotation of spring wheat-winter wheat or a three-year rotation with spring barley-peas-winter wheat. After growing canola several times to determine the best

“We really like the fact that we don’t have to make any equipment changes by choosing to grow canola.”

—John Hinnenkamp

crop sequence, John settled on a three-year rotation: spring barley, spring canola, and winter wheat on 2,500 acres. That results in about 625 acres of spring canola every year, spread out on 3 fields. “Our canola is the first crop to be planted in the spring; we try to hold off on seeding until after hard frosts, but also try to get it in as early as possible. So far we haven’t ever had it freeze out. The canola is also the last to be harvested, sometimes 10 days after wheat harvest,” John said. He broadcasts the canola seed at 5–7 lbs/acre and 5.5 mph with a 42-foot wide rig that includes a Valmar™ spreader with a mounted harrow and packer to get the seed to ~ ½ inch depth. The packing isn’t necessary if there is a “good hard rain” after seeding. He divides applications of 95 lbs N/acre, and 15 lbs S/acre in the fall prior to the spring crop and before planting in the spring. However, John doesn’t feel the fall application is beneficial, so next year he plans to shank in fertilizer before spring seeding.

Cabbage pod weevil and more recently, loopers, are the main insect problems. When John needs to apply insecticide he makes sure to spray as early in the



Figure 11. If aphids are above economic threshold levels, John will apply a pesticide at the end of bloom stage.

morning as possible to minimize the effect on bees. This crop year, he sprayed with Warrior® (lambda cyhalothrin) for aphid and pod weevil at the end of bloom stage (Fig. 11). He's found Roundup to be very effective for weed control when applied to canola at the rosette stage, prior to bolting. "That kills all the weeds, and within 3–4 days the canola bolts, canopies, and has leaves large enough to cover the row and shade out other weeds," John explained. "Another thing worth mentioning is that we haven't used Pursuit for 15 years, but from our experience, I would say the residual is more like 6 years, not the 3 years listed on the label. After 6 years, we could still see damage in the canola."

John harvests his canola directly with a Case IH rotary combine with a 30-foot header when seed moisture is at 8 percent. "When we first started growing canola we were concerned we would have to swath it, but we've done just fine direct-harvesting. We slow the fans to 850 rpm and the rotors to 450 rpm, and adjust the top sieve to 1/4 inch to 3/8 inch. We close the bottom sieve, then open it just a crack to minimize seed loss as much as possible," John said (Fig. 12). "During our first canola harvest we were probably getting the canola too clean and actually losing seed because of that. Now we aren't quite as particular if there are a few hulls in there, and we've never had an issue with dockage." Yields have ranged from 1,200–2,400 lbs/acre, which is in line with a goal of 1,800 lbs/acre.

Marketing

"I have never contracted my canola, as I am concerned about getting enough yield to meet contract, especially if and when I have shatter



Figure 12. Adjusting combine settings for the small seed size of canola is critical to minimize seed loss during harvest.

problems," John explained. "I delivered to Columbia Grain in Colfax the first year, and continued to do so until this year when I switched to Primeland Cooperative at Estes Elevator near Moscow. Their pricing and storage rate were better. I watch the market and then decide when and where to sell."

"I'm all for biofuels, but it bothers me that probably 90 percent of the canola I've grown over the years has ended up in Canada. We need to find and implement ways to market our crops here, locally, in Washington," John added.

Challenges

"Our number one problem when we started growing canola was getting away from Pursuit," John said. As mentioned previously, damage can still be observed in corners 6 years after Pursuit application. "You really, really need to watch your chemical rotation," John cautioned. Another issue that took some time to resolve was volunteer canola, which could be controlled with 2,4-D, but required earlier spraying in the spring than John would sometimes choose for the wheat. "We found that if we go in with an herbicide that has a residual, that gives us another 10-14 days to kill weeds that aren't up and going yet like the volunteer canola. It added a couple dollars to the tank mixture, but it saves another trip across the field," he explained. Lastly, there has been up to 30 percent shatter loss, either from wind or rain that snapped whole pods off in pockets on hillsides.

Successes

By using Roundup Ready canola, John says that control of wild oats and other weeds is "outstanding." Another benefit from spring canola is that the stalks stay standing during the winter where winter wheat is planted. This increases both snow capture and wind protection (Fig. 13). "We have had very little freeze damage in those fields, and the stubble is not really thick enough to cause any trouble seeding future crops," John commented. "I would say more than half the time the wheat after canola is as good as or better than after chemical fallow, and I think that can be attributed to the canola stubble." John added that since the canola is the last crop harvested, he can release extra harvest employees, and finish the canola with just 2 combines. An unexpected success happened one year when they were rained out during canola harvest. "We got back into the canola field quicker than if it had been barley. There is just so much air movement through the canola and it was amazing how quick it dried out so we could continue harvest," John said. "Another thing we like about spring canola is that

Snow Trapping by Standing Stubble Increases Soil Water and Yield Potentials

We have all seen snow redistributed across the Palouse landscape during some of the severe wind events during the winter. Snow tends to blow around on bare soil from south-facing slopes and accumulates on north-facing slopes. Leaving stubble standing over winter can mitigate this effect. Research conducted by Huggins and Pan (1991) demonstrated that direct seeding winter peas into winter wheat stubble increased seedling vigor over winter and resulted in a 32% increase in pea yield. More recently, Qiu (2008) found at Cook Agronomy Farm near Pullman that standing stubble increased soil water storage by 0.5, 1.1, and 2.4 inches on toeslopes, south-facing side slopes, and summits, respectively. Increased soil water storage from captured snow in crop stubble directly translates into higher yield potentials!

References

- Huggins, D.R. and W.L. Pan. 1991. Wheat Stubble Management Affects Survival, Growth and Yield of Winter Legumes. *Soil Science of Society America Journal* 55: 823-829.
- Qiu, H. 2008. Snow Redistribution and Soil Water Storage as Impacted by Surface Residue Conditions. M.S. thesis. Department of Biological Systems Engineering, Washington State University.

even though it likes water, it also likes heat. When it's 90°F during vegetative growth and the spring wheat is starting to hurt, the canola is loving it!"

Advice to other growers

John advised first-time brassica growers to try *some* acreage, and then make a decision whether or not to grow more. "The first year we planted 125 acres of spring canola, and we were scared to death!" John related. "However, things worked out, and we've been growing it ever since. Keep in mind that everyone is different, and will respond differently to the suggestion to grow oilseeds."

It is also important to find a field consultant who is knowledgeable, that will read and explain labels, and find answers for your questions. "At the same time, you need to be willing to work with the field rep, so you can both learn together," John said. He also advised to consider the costs involved with



Figure 13. Canola stubble is easy to seed winter wheat into, and also helps with snow capture.

fertilizer inputs, particularly when those costs are increasing. "Spring canola or another brassica crop may not pay out yield-wise against a spring wheat crop, but for rotation, and being able to put fall wheat back in after canola, it may end up paying," he explained (Fig. 14). In addition, chemical inputs in peas and garbanzo beans are high, and weed control particularly in garb fields is tough, so putting in a different crop like canola gives more options for reducing chemical use.

John stressed the value of knowing your chemical history and rotation history. "You need to choose your fields carefully, but don't get too discouraged by seeing chemical damage or moisture problems in spots in the first couple of years—it's not going to forever be that way. If you can stay with it and just get through those cycles, your next three-year rotation is going to be a *lot* better. Another thing we didn't realize about Pursuit until we stopped applying it and started rotating canola was how bad the herbicide was hurting our wheat. If you stay in a rotation with Pursuit like we were, you don't see it. But after the sixth year especially (without Pursuit), we could really see it—the wheat yield was good, but the corners where chemical was doubled up had 20 percent less yield, which is what the *whole* field was yielding when we used Pursuit. Every year without Pursuit we saw better wheat in field corners,



Figure 14. John has not had summer fallow for 5 years since working spring canola in to a 3-year rotation.

on ridgetops, on clay soils, any place that held the Pursuit longer.” One last bit of advice from John is to consider the cost of insuring a canola crop. Currently it is high for canola, so he has opted not to take insurance—“we just take our chances, and in 13 years we haven’t gone wrong. I will say this—we have never been disappointed with canola in our rotation.”

Rich and Judy Olson R & J Farms, Garfield



Figure 15. Rich and Judy Olson farm near Garfield and have grown spring canola to expand their crop rotation and address herbicide carryover issues.

Nestled in the Palouse region of eastern Whitman County, Rich and Judy Olson's home farm is near Garfield on Highway 27. They farm 3,000 acres for 10 landlords. After returning to Washington to farm in 1974, the Olsons have grown winter wheat, lentils, spring wheat, spring barley, soybeans, and spring canola in a 20-inch precipitation zone. Most of the acreage is highly erodible, consisting of Athena and Palouse silt loam soils. Rich first tried growing spring canola 25 years ago as an alternative crop to help control weed problems in the traditional wheat-lentil rotation. With minimal knowledge of how to grow or harvest canola, Rich had a "reasonably good crop," but did not grow it the following year because of contract changes. Several years ago, he decided once again to plant spring canola instead of lentils. "We are now in the process of trying to expand our crop rotation to deal with some chemical carryover in the ground, which is Pursuit from a wheat-lentil rotation," Rich said (Fig. 15). "Winter oilseeds may not be the answer here, but I believe spring oilseed crops can be once we learn enough about growing and processing them. "We need an oilseed that will complement winter wheat, not compete with it." Despite mixed success growing spring canola, Rich is still very interested in developing a three-year rotation that includes canola, and he believes the future of farming is "growing our own fuel without depending on other sources."

"Winter oilseeds may not be the answer here, but I believe spring oilseed crops can be once we learn enough about growing and processing them. We need an oilseed that will complement winter wheat, not compete with it."

—Rich Olson

Agronomics

The nutrient management plan Rich follows for canola is similar to spring barley, based on soil tests. The average nitrogen rate has been 85 lb/acre, with 10 lb/acre each of phosphate and sulfur. "I prefer to apply all of the fertilizer late in the fall, like mid-October, for my spring crops. That avoids another trip across the fields I would have to make for spring topdressing. The low soil temperature in the fall keeps the ammonia from converting until the soils warm up in the spring," Rich explained. After beginning to direct seed 10–12 years ago, Rich gradually changed to 100 percent direct seed over the next 3–4 years. In the direct seed system, he feels it is important to consider surface residue when making fertilizer decisions. "For winter wheat stubble, fertilizer helps decompose the residue and make the nutrients in it more available to the following crop."

Rich uses 35-foot wide modified JD-455 grain drills to plant both fall and spring crops. Two years ago he experimented with both 7 ½-inch and 15-inch row spacing for canola (Fig. 16). "The yield was a little better with the 15-inch spacing, but the weed control was much poorer, and that affected the following wheat crop. I am going to stick with using 7 ½-inch spacing." Rich seeds the canola at 5–6 lb/acre, which is slightly higher than recommended, but he feels that rate helps to get an early, vigorous stand of canola to outcompete the weeds. Italian rye and cheatgrass are the most common grass weeds, while sowthistle can be "a huge problem" as it comes later in the season. "I've used Osprey in the wheat crop to



Figure 16. Rich conducted his own experiment to test weed control and yield variation of spring canola with different row spacing.

take out cheatgrass, but that may also have carryover issues,” said Rich. Aphids are the primary insect pest, and when they are above threshold levels he has insecticide aerially applied to control them. “One time there was a strip of canola the airplane missed, and the aphids ate it all in that area—there wasn’t anything left but grey stalks, and the plants had been 18–24 inches tall when we sprayed,” Rich recalled. Deer and elk can also be a problem in spring canola, as they will eat both green pods and blossoms off the top of the plants.

In 2008, Rich set up test plots to see the effects of Pursuit carryover from previous applications to pulse crops. He had not applied Pursuit to the field for six years. He planted Roundup Ready canola on half of the area, and Clearfield canola on the other side. On the Clearfield side, there was no evident consequence from Pursuit carryover. However, on the Roundup Ready side, “the canola came up great, but then the growth just stopped (Fig. 17). The plants were badly stunted, and the weeds kept coming because there was no competition from the canola. The maturity was delayed so long that pods were still green on part of the plants and ripe on the other. In areas where the sprayer had backed up or overlapped when the field was in lentils six years ago, the effect from Pursuit was very obvious. There were places where the canola didn’t even establish. This is not an easy thing to deal with (Pursuit carryover), and we’re trying to find a way to make it work.”

To harvest the canola, Rich runs his Gleaner R-72 combine with a 27-foot header at 3 ½ mph and with the reel as high as it can go. He has observed a lot of canola shattering in the header before it even gets to the cylinder. In 2006, the canola yielded 1,100 lb/acre on 60 acres. Rich remembers neighbors

thinking he was “crazy” for even trying canola, but he thought the results “weren’t too bad for my first big field experience.” After harvest, Rich discovered there was a lot more shatter loss than he realized. “I figured I had a potential yield of 2,000 lb/acre, but only ran 1,100 lb/acre through the combine due to shattering.” The following year, yield was only 650 lb/acre, with “terrible weed control.” In 2008, the yield averaged about 1,300 lb/acre for both Clearfield and Roundup Ready varieties, despite the stunted growth and uneven ripening in the Roundup Ready that required extensive cleaning with a rotary screen in order to separate the green material from the mature seed. Rich used duct tape to plug any leaks he found, describing the canola seed as “flowing out like water” without it. He tries to harvest uphill when possible to avoid seed escape from the header. “In the future I will probably harvest sooner when we know the majority of the pods are ripe, and just the lower stems and pods are green. We aren’t as paranoid now that we’ve learned that it’s okay to



Figure 17. Pursuit-damaged spring canola on the R&J farm. Emergence was normal, but then plant growth stopped.

harvest when the plants are still kind of green.” Rich has not grown spring canola since 2008, as he is waiting out the plantback restrictions from previous chemical applications before seeding it again.

Marketing

“There is no doubt that marketing these oilseed crops can be both challenging and frustrating,” commented Rich. “The yield of lentils and canola are about the same on my farm, so I need to determine which crop will be the most marketable, and of course work around chemical plantback restrictions.” He stores the harvested canola seed during the winter, and then researches the choices available for

selling the seed the following year. From 2006 to 2008, Rich sold canola to three different facilities: Walla Walla Grain Growers (Prescott location), Whitman County Grain Growers, and Inland Empire Oilseeds in Odessa. “There still remains the issue of the lack of infrastructure to deal with the canola. When I sold to Walla Walla Grain Growers, the canola was only accepted at one elevator in their whole system, which at the time was Prescott, so that’s where I hauled it.” When he grows canola in the future, Rich said he will follow the same practice, checking all possible options before making any marketing decisions.

Rich firmly believes that marketing is only one part of a goal of improved oilseed production in any region of Washington. He envisions programs centered around oilseed crop infrastructure, with an emphasis on the farm level, not the industry level. “It’s a daunting challenge to do the whole process, from planting to crushing, processing, and marketing. That’s why I believe local infrastructure is so vital. A local effort would be much more cost-effective and productive without so many of our dollars going somewhere else for fuel, fertilizer, and taxes that suck the life out of the local economy. I also believe this approach would go a long way towards keeping many of our small towns alive. I know for a fact that every bit of canola meal I could produce would be sold locally to livestock producers, because it is such a high quality product.” A final marketing idea from Rich: “I would love to see a cook-off for canola like the lentil or pearl barley one. I think with the right ingredients an energy trail mix bar utilizing locally grown canola meal would be great!”

Challenges

Without hesitation, Rich stated “Pursuit carryover is *the* biggest challenge to growing canola. Curtail also causes carryover issues from application 3–4 years ago to the wheat crop. “The carryover Pursuit still in the ground has affected the weeds to the extent that they are tolerant of the herbicide, so putting any more on would be useless. However, by not using sulfonyleureas like Pursuit I am limited on what weed control options I have,” Rich explained. “Dog fennel is a serious problem in my area (Fig. 18), along with sowthistle, and having both those weeds as well as chemical carryover makes it difficult to grow a good canola crop. It’s a frustrating situation. What I would like to see is canola varieties that can have both the Clearfield and Roundup Ready traits in the same plant.” Rich thinks this would open up the majority of his acreage that currently has both chemical carryover issues and weed problems.



Figure 18. Dog fennel is one of the broadleaf weeds that shows resistance to Pursuit due to carryover chemical in the soil. Pursuit carryover has exceeded four years in some fields on the R&J farm, making it a challenge to grow canola.

“Seeding rate and row spacing are challenges, but manageable ones,” Rich continued. Local infrastructure is essential—“we need to get and share good advice, and the local market needs to understand local circumstances. With a local market we would not be paying transportation costs to other places.” The collapse of the U.S. dollar is another challenge Rich mentioned, which he associates with higher input costs due to importing so many of the supplies needed to produce crops. Ripening differences in the same field have proved a challenge during harvest (Fig. 19), and require creative seed cleaning to get the chunks of weeds, green stalks, and pods out before storing the seed. “We’ve learned that goes back again to knowing the chemical history and avoiding ground with a chance of carryover



Figure 19. Rich points out the variable seed color he attributes to ripening differences in the same field.

from previous years whenever possible,” Rich commented.

Advantages

The field where Rich grew 60 acres of canola in 2006 was split with lentils planted on the other side. After harvest both sides were planted to winter wheat, and the wheat yield was average at best due to weed problems. The following year the field was split the other way and winter wheat planted for the second year in a row. “That was the best wheat we raised. The wheat on the ground that had canola on it two years ago was the cleanest field, with no weeds. It was noticeable to the line where both the lentils and canola had been, without anything done differently to either side.” Rich wonders if that may be attributed to nitrogen becoming available from the quantity of shattered canola seed on the ground from two years before this wheat crop. And, Rich has observed that the canola “does something to the soil, maybe from the roots working through the soil. So, even with mixed success growing canola, do I see an advantage to having an oilseed crop in my rotation? Absolutely,” Rich emphasized. Another advantage he noted was not having to make any equipment changes. An interesting positive effect Rich has observed is the fairly quick decomposition of canola stalks before the following wheat crop, which makes a big difference in direct seeding. “In six months the residue is gone, and it looks like there was no canola in the field. For this reason, I concur with Dr. Bill Pan’s research at WSU on nitrogen cycling in canola being more rapid than nitrogen cycling in cereal residue.”

Since the Olsons started direct seeding all of their crops, their annual diesel fuel usage has decreased from 25,000 to 9,000 gallons. “If I can grow an 1,800 lb/acre canola crop, I would only need 160 acres to provide enough fuel for the rest of the 3,000 acres I farm,” Rich said. That translates to about five percent of the land dedicated to fuel production.

Advice to other growers

Like many other growers who have experimented with oilseed crops, Rich encouraged others to “start small—the learning curve is immense, and you need to accept that it will be a learning process.” Secondly, “be knowledgeable of chemical history—you better

Biodiesel is Good for the Environment

Much has been debated about the net energy balance and environmental impacts of biofuel production. Corn-based ethanol and crop production especially have come under intense scrutiny for their intensive energy requirements and potential negative impacts on agroecosystems. However, crop-based biodiesel has received the more favorable review of the two. Biodiesel yields a 220 percent energy gain over the energy required to produce it (DOE and USDA, 1998). Furthermore, a lifecycle analysis performed by EPA (2010) indicates the use of canola-based biodiesel results in a 50 percent reduction in greenhouse gas emissions compared to petroleum-based diesel.

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have really, really good chemical records before you ever put an oilseed in the ground.” And thirdly, “anyone in this area will need to address Pursuit carryover head on” to successfully grow oilseed crops.

Another important step in the learning process is to find a field rep you can trust who is knowledgeable about oilseed production, or who is willing to find the answers you need to be successful. “Eventually you need to be willing to be ‘the expert,’ which will require keeping track of the whole process, from buying the seed, to marketing, to when you cash the check,” Rich added. One last item he cautioned about is that because there are no historical risk factors for oilseed crops, new growers need to think carefully about buying crop insurance, and be certain it will help before committing to it.

Del and Steve Teade Colfax



Figure 20. Steve and Del Teade are growing yellow mustard as a regular part of their crop rotation near Colfax.

Del and Steve Teade farm southwest of Colfax in the 17-inch rainfall zone on Athena silt loam. After attending the Ag Show in Spokane many years ago and being encouraged by Spectrum Crop Development to try winter canola, the Teades debated growing the crop. With the price of peas continuing to drop and harvest becoming more of a hassle, the Teades eventually decided to try canola. Since then they have grown winter canola, spring canola, and mustard with a typical rotation of winter wheat-spring grain-oilseed. The first year they had a “terrible seed bed with trashy conditions. We used a conventional drill, and basically we didn’t know what we were doing.” Not to be deterred, Del and Steve put what they learned from the first year into growing winter canola the following year. Their perseverance paid off with a 2,700 lb/acre yield on summer fallow ground. The third year of winter canola was a difficult one, as soil temperatures were too high at planting, and with minimal seedbed moisture, germination was very poor. After that experience, the Teades switched to spring canola, and when the price of canola went down and the cost of inputs increased, they changed gears again and started growing mustard. In recent years the Teades have averaged 250 acres in oilseed crops of the more than 2,000 total farm acres, primarily mustard (Fig. 20). “We like mustard in place of DNS spring wheat in our rotation of winter wheat-spring crop-chem fallow.”

As far as other oilseed crops, Steve commented that “we are interested in camelina, but it has limited labeled herbicides, the price for it is not competitive yet, and we lack information on what insects attack it.”

Agronomics

The Teades have experimented with different seeding techniques, including drills and row spacing. “We’ve broadcast seeded with a Valmar™ and a harrow at 5–6 lbs/acre. We tried our Great Plains double-disk drill with both 7 and 10-inch spacing and had more in-row competition than with broadcast. It tends to struggle more with heavy residue. We recently used an AgPro air seeder on 12-inch spacing, but we seemed to be getting more weed competition with that spacing, and it was more difficult to keep a consistently shallow planting depth. The Valmar is best on conventional farming ground, but not for direct seeding. And, we can’t put on phosphate with the Valmar.” The Teades use a Steiger Panther to pull the AgPro drill, a John Deere 8640 for the Great Plains drill, and any available tractor with the Valmar and harrow. They direct seeded the 2010 spring mustard crop in early April using the Great Plains drill at 7 lbs/acre with 10-inch row spacing, half-inch seeding depth, and a speed of 4.5–5.0 mph.

Tillage has also been a learning process, as the Teades have been trying direct seed for about 10 years (Fig. 21). One year they had an oilseed crop in a field that was plowed and disked, and another field that was direct seed. When the seed first germinated the plowed field looked the best, and the direct seed field looked very spotty, but at harvest the direct seed field yielded the best. “We think that was due to moisture—the plowed ground ran out, and it’s also possible the roots hit the plow pan. We probably reduce our fuel use by half with direct seed, but we’re still in the learning curve to handle residue with the drill,” Steve explained.



Figure 21. Mustard beginning the bolting stage in late spring. Note the residue from the previous year’s wheat crop. The Teades are learning how to manage residue with direct seeding.

The Teades fertilize their mustard at planting similar to barley, with about 80 lbs nitrogen (as UAN solution 32), 25 lbs sulfur, and 10 lbs phosphorus 5 inches deep and to the side of the seed row, in front of the coulters. “We have tried fall fertilizing, but we worry about leaching, especially with the strange weather patterns we have had lately,” Del and Steve commented. Pesticide applications have not been necessary, making the mustard crop fairly “low maintenance.” They typically direct harvest mustard in early to mid-August with a Case IH 2388 and 30-foot header. Mustard yields over the last five years averaged 800–1,000 lb/acre, lagging behind Steve’s goal of 1,200 lb/acre.

Marketing

The Teades usually contract oilseed crops, but in 2010 they sold the majority of their mustard on the open market as they do for wheat (Fig. 22). “That was different for us with the uncertainty of dealing with the open market for our mustard, but McKay Seed in Moses Lake took all of the crop,” Steve said. “Like wheat and other crops, if the mustard does not do well elsewhere, say in Canada, it may end up helping the market price for us. More choices of locally grown oilseed crops could increase the seed supply and reduce the cost of the seed itself.” He added that “oilseed meal should have a higher value on the market” because it has higher protein levels than alfalfa hay. Del and Steve agree that biofuels have potential, but there also needs to be some kind of monetary incentive to farmers that would convince more of them to try growing an oilseed crop.



Figure 22. Mustard has been the most profitable oilseed crop to contract in recent years; in 2010 the Teades sold most of their harvested seed on the open market.

Challenges

One of the main reasons the Teades switched from winter to spring canola was the lack of consistency in the winter canola, from emergence problems to wide variations in yield. However, “if we could get to moisture with a hoe drill, we would probably try winter canola again,” Steve said. Spring canola and mustard are not without challenges either, particularly in the direct seed system Del and Steve are gradually adopting on most of their acreage. “We’ve had difficulty with stand establishment in stubble when the soil is cold in the untilled ground,” Steve explained. “We are also working on making adjustments to our drills to reduce the effect of fertilizer on the seed, which can impact germination. Another reason we continue to grow mustard instead of spring canola is our spring canola yields were so variable, ranging from 900 to 2,000 lbs/acre. We like to see more consistency than that!”

Another challenge has been the few choices of chemicals labeled for oilseed crops. “Although

Using Oilseeds has Rotational Benefits

Oilseed rotational benefits may be manifested in breaking disease weed cycles, allowing more effective weed control in subsequent crops, improving nutrient cycling, and increasing crop residue returns, soil surface protection, and soil tilth. In an experiment near Genesee, Idaho, comparing legume and wheat rotations with oilseed and wheat rotations, mustard residue soil coverage was maintained above 50 percent, while pea and lentil residues fell below 30 percent after December (Guy and Gareau, 1998). Guy also found that winter wheat following broad-leaf oilseed and legume crops averaged 29 percent greater yields than following winter wheat and 20 percent greater than following spring wheat (Guy et al., 1995).

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“We are getting up to 15 bu/acre better wheat yield in recrop situations after oilseed crops. When we recrop wheat after wheat we average 10 bu/acre less than wheat recropped after oilseed crops.”

—Steve Teade

we have Select™ labeled for mustard, we need labeled herbicides for all weed control issues in the mustard and canola,” commented Steve. “We need an herbicide to control bedstraw and pigweed in mustard, in particular. (Mustard cannot have bedstraw seed in it due to the inability to remove it, causing a severe dockage.) We also need to have herbicide labels consistent with Canadian herbicide labels.

Successes

“We are getting up to 15 bu/acre better wheat yield in recrop situations after oilseed crops,” Steve remarked. “When we recrop wheat after wheat we average 10 bu/acre less than wheat recropped after oilseed crops, and the wheat following an oilseed crop has a better, more even stand, and better weed control.” Del added they have observed that “canola compensates if the stand is thin, especially fall (winter) canola, and the yield is still decent.” When comparing canola with mustard, the Teades noted that canola has a bigger leaf, so it fills in the canopy and shades better than mustard, resulting in better weed suppression. “One thing we really like about the mustard, though, is that we can leave it in the field until the other crops are in without worrying about shatter or other problems,” Del commented (Fig. 23). Steve added that as the mustard reaches maturity, the pod is like a shrink wrap around the seed, protecting it from shatter. “However, we have grown mustard rather than canola for the past nine years due to economics. Mustard has been better for us due to flexibility, profit, and less expenses even with an open market. We like how mustard does not tend to need the ‘babysitting’ that canola does in terms of insect pests and fertilizer.”



Figure 23. Mustard does not tend to shatter as easily as canola, so it can be the last crop harvested.

Advice to other growers

Del and Steve’s first advice to anyone considering growing an oilseed crop is to know the chemical history of any field where you will plant an oilseed crop. Thinking back to when they first tried growing canola, Steve remembered that “we found out the hard way” about the impact of herbicide carryover. “We had a strip in the field where Maverick was



Figure 24. Del and Steve observe mustard tap root growth. This field was direct seeded in April 2010 following spring wheat in 2009. They encourage first-time oilseed growers to “start small with a good field.”

previously applied to control cheatgrass in wheat. We planted canola, it came up fine, then it got more and more yellow, and the south side and clay ridgetops were very poor that year." Another recommendation is to start small to "get a feel for it"—like 25–30 acres, and choose a good field (i.e., a level one; Fig. 24). Other suggestions the Teades have are to seed early in the spring, even though the crop may be susceptible to frost; look at the markets for the best price available and what will work with your current rotation; and use Roundup Ready canola if it pays. "It may be a little spendy on the front end, but it's a sure way to clean up a field," they explained.

Summary

There are many similarities and a few interesting differences amongst these growers in their approach to oilseed production in the region (see Fig. 1). Growers still consider winter wheat to be their main cash crop, so canola is still thought of as an alternative rotation crop. Predominate annual cropping in this precipitation zone means the seeding of annual rotational crops must be after the summer harvest of a preceding grain crop or during the subsequent spring. As with other crops grown in this area, successfully established fall-seeded varieties can have 25–50 percent more yield potential than spring-seeded varieties. However, there are two problems with fall seeding a winter canola crop following a summer grain harvest. First, the soil in an annually cropped system is often too dry and sometimes too hot to stimulate immediate germination in August and September. Second, once the late summer or fall rains arrive, there typically are not enough growing degree days to germinate and grow the canola seedling to a size sufficient for winter survival from freezing stress. For these reasons, all five of the featured growers in this region have chosen to focus on the production of spring-sown oilseeds.

Similarly, the entire group in the high rainfall area substitutes spring canola or spring mustard in place of a spring cereal, spring legume, or fallow in their crop rotations. Production challenges include wet spring weather that can sometimes delay planting, spring frost kill, and herbicide carryover from previous production of pulse crops or herbicide-resistant wheat that can limit the opportunity to try oilseed crops due to herbicide plantback restrictions. Several growers have experienced extended herbicide carryover and plantback restrictions that exceed chemical label guidelines. With canola prices more than doubling in the last five years, and the mustard market trending downward, growers emphasize the need for due diligence when it comes to making rotation and marketing decisions. Despite these limitations, producers who decided to try growing

oilseed crops a number of years ago or just recently are continuing to do so as a regular part of their rotation.

When asked what research is needed to improve their oilseed production, some of the suggestions included the following:

- varieties with improved pod shatter control, oil and meal content and quality, shorter stems, adaptation to marginal land, and improved herbicide resistance
- farm-scale variety testing
- rotational effects on soil health and biology
- more weed control options and seed treatment efficacy
- reduced oilseed yield variability
- the economic feasibility of growing different oilseed crops with fluctuating market prices (currently under investigation at WSU)

Seeding rates and planting and tillage methods vary the most between the farms, ranging from direct seed systems to broadcast spreading/harrowing. Fertilization with nitrogen and sulfur is similar to rates typically used with other spring crops in the region. The main insect pressure observed is the cabbage pod weevil; aphids are common but not usually at threshold levels.

The growers commonly cited the ability to insert a broadleaf crop with a resistant trait into their rotation to reduce problematic broadleaf (e.g., dog fennel, sowthistle) and grassy weeds (e.g., jointed goatgrass, feral rye). Other benefits include improved soil health and soil structure, rapid residue decomposition, root bio-tillage, nitrogen cycling, and increased snow trapping. A majority of the growers report increased winter wheat yields following oilseed crops compared to other rotational options. Average yields are 1,000 to 1,800 lbs/acre for spring canola and 800 to 1,300 lbs/acre for spring mustard. A condensed version of their advice to new growers is provided below.

Oilseed Production Tips

- ✓ *Check field history for herbicide plantback restrictions.*
- ✓ *Select varieties that perform well in your growing region.*
- ✓ *Develop a timing and density strategy for seeding to optimize stand establishment and survivability.*
- ✓ *Develop a soil test and field history-based fertilizer management plan that accounts for residual nutrient carryover in your rotation.*
- ✓ *Develop diversified weed management strategies for addressing immediate field-specific weed pressures.*
- ✓ *Minimize long-term herbicide carryover and avoid development of herbicide-resistant weeds.*
- ✓ *Use integrated pest management strategies, including scouting fields to determine economic thresholds of insects before making treatment decisions.*
- ✓ *Talk with other oilseed producers in your area to find out what they have learned works best for them.*
- ✓ *Survey and compare local oilseed marketing options, including on-farm uses of byproducts such as meal, biofuel, and food grade oil.*



Use pesticides with care. Apply them only to plants, animals, or sites as listed on the label. When mixing and applying pesticides, follow all label precautions to protect yourself and others around you. It is a violation of the law to disregard label directions. If pesticides are spilled on skin or clothing, remove clothing and wash skin thoroughly. Store pesticides in their original containers and keep them out of the reach of children, pets, and livestock.

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