Annual Crop Ideas for the Willamette Valley
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The Willamette Valley has an extremely favorable environment for growing winter annual crops. Grasses, winter grains, clovers, cool season vegetables, and brassica seed crops achieve some of the highest yields in the world. Conversely, warm season crops tend to be disadvantaged by the environment. The lack of summer rain inhibits dryland crop production unless irrigation is available and cool night temperatures can slow crop growth and delay maturity beyond acceptable dates. From a Cropping sustainability standpoint, the goal of agricultural producers in the Valley should be to optimize production practices to maintain the highest percentage of cool season, non-irrigated crops in cropping systems as possible. This goal is not new and there are no "silver bullets" in reaching the goal. What we need to determine is if there are new tools or opportunities today that can further move us toward this goal.

I suggest that what we need to do is think differently. Do not assume that we are just biding time until grass seed markets rebound. Do not ask what you can grow – we can grow almost anything – but rather ask what can be marketed, at what price, and about the stability of markets. Also consider other risk factors such as harvesting, labor, crop insurance, etc. Here are a few random thoughts to spur your thinking:

- We know that we can grow exceptional wheat crops in the Valley but there are three major issues – takeall disease if the crop is grown repeatedly on the same ground, storage of large volumes of wheat and transportation to Portland
    - Should we ask researchers to focus efforts on learning the state of the current art in dealing with take all?
    - Are individuals or groups interested in building and managing new storage? FSA has some loan programs in place for building storage facilities. Perhaps government grants could be found to assist in such an effort.
    - Rail spurs have been developed in the past to allow loading of rail cars for grain delivery to Portland or other locations versus trucks. Does this make long-term sense and if so, what needs to be done to develop such capability?
    - Some growers have hauled grain to Mid-Columbia Coop in eastern Oregon for storage and marketing. What are the pros and cons of expanding this program?

- We know that we can grow readily grow winter oats, winter barley and winter peas in the Valley. There are local, small to large volume feed users. Shall we have a conversation with these feed users to determine if they would be willing to consider use of these feed stuffs and if so, under what conditions? It would need to be understood going into such discussions that the aim is to develop local, sustainable partnerships. There is consumer demand for locally grown foods. Small producers should be interested in local feeds and larger feed users may have new interest in segmenting out a portion of their operations to meet a local food market.

- There is a desire for locally grown grains and pulses. The markets are likely to be small but can perhaps be a profitable sector of some growers operations. Shall we have a conversation with those desiring local foods to determine if local partnerships are possible and under what mutually agreeable conditions?

- There are several companies interested in local fiber sources for use in developing sustainable building materials. Is winter flax a possibility in this realm? Could we grow sunflowers just for their stalks? Grain straws? Can we aid these companies in their R&D efforts?

- Chunckanut Products Inc of Albany/Corvallis makes wildlife and pet foods of various types and imports seeds for use in these mixtures from other parts of the US – millets, sunflower, Niger thistle, etc. Can these crops be grown locally if the crop residue is also used as a fiber or biofuel source?

- There is great interest in soybeans. How do we fund needed research to
    - Test the reliability of production in the Valley?
    - Test currently available varieties from around the world for local adaptability?
    - To quickly increase seed stocks of what seem to be locally adapted materials?

- Land leases and rents are a major part of production costs. Given the "sea change" that seems to be taking place in world economies and world agriculture, should we focus some effort on determining what equitable land lease and rent prices are might be in today's economy? Would educational materials for use in negotiations with land lords be of use?

Bottom line

- Focus on what there are markets for, not what can be grown
- There are no "silver bullets" but may be options for individuals and groups of growers to meet local feed, food and seed crop needs
- There is great interest in identity preserved marketing – may be possible to create markets
- In some cases (wheat, possibly locally grown feed grains) the issue is not production or markets (though price is a concern) but rather storage, transportation and consistent delivery – all issues that perhaps can be worked through

Ideas Index

Below is an index of crops for which "idea" sheets are provided. These describe some of the basic environmental criteria for the crop (soil type, irrigation requirements, etc.), basic production practices, available markets or ideas about marketing, known constraints and where available, web sites or printed materials through which additional information can be gained. These sheets have been authored by Russ Karow and several other OSU scientists and students, so there is some variation in format among them. My thanks to authors Sabrina Beske, Mike Flowers, Pat Hayes, Steve Norberg, and Rich Roseberg.

Spring Wheat, Barley, Oats, or Triticale

Spring small grain cereal crops such as wheat, barley, oats, and triticale can also be grown in the Willamette Valley. However, unlike the winter grains, successful production of spring grains typically requires irrigation. Due to this extra cost and the generally reduced yields of spring grains compared to winter grains, the spring grains are a less attractive alternative crop. In addition, the marketing and sale of the spring grains is similar to their winter counterparts. Thus growers should identify a market or outlet for spring barley, oats, and triticale prior to their production. Spring wheat can be marketed and delivered to Portland similar to winter wheat. Other considerations include:

1. Spring wheat production is similar to winter wheat production except:
    a. Soft white spring wheat is the recommended wheat class for the Willamette Valley
    b. Spring wheat should be seeded in mid-February to late-March.
        i. Mid-February seedings can reduce or eliminate the need for irrigation
    c. The seeding rate of spring wheat should be 1.5 times the recommended soft white winter wheat recommendation
    d. Spring wheat is also susceptible to Hessian Fly and thus a preventative seed treatment is recommended
    e. The nitrogen fertilizer rate recommendation is 1 pound of nitrogen per acre for each expected bushel
    f. Controlling grass and broadleaf weeds is important
        i. Note that herbicides labeled for winter wheat may not be labeled for spring wheat
    g. Disease and insect control is important
        i. Stripe rust is the major disease of spring wheat
        ii. Aphids, Hessian fly, and cereal leaf beetle are important pests of spring wheat
    h. Growers should consider the use of a plant growth regulator to reduce lodging, especially under irrigation
    i. Harvest is typically in late August
        i. Late season rains may cause sprout problems
    j. Spring wheat is also susceptible to the disease take-all and thus spring wheat is not a break crop for winter wheat
2. Spring barley production is similar to spring wheat production except:
    a. Important barley diseases include barley scald and stripe rust
        i. Few varieties are resistant to both diseases
    b. Nitrogen fertilization should be 80% of the standard spring wheat recommendation
    c. Ensure that any herbicides, fungicides, and insecticides are labeled for use in barley
    d. Harvest typically occurs in August
    e. Barley is also susceptible to the disease take-all and thus is not a break crop for winter wheat
3. Spring oat production is similar to spring wheat production except:
    a. Nitrogen fertilization should be 60% of the standard spring wheat recommendation
    b. Ensure that any herbicides, fungicides, and insecticides are labeled for use in oats
    c. Harvest typically occurs in August
    d. Oats are generally the most resistant small grain cereal crop to the disease take-all and can serve as an effective break crop for winter wheat
4. Spring triticale production is similar to spring wheat production except:
    a. Ensure that any herbicides, fungicides, and insecticides are labeled for use in triticale
    b. If a forage type is grown nitrogen fertilization should be 80% of the standard spring wheat recommendation to help reduce lodging
    c. Harvest typically occurs in August
    d. Triticale is susceptible to the disease take-all and thus is not a break crop for winter wheat

Winter Barley, Oats, and Triticale

Other winter small grain crops such as barley, oats, and triticale can be grown in the Willamette Valley. These alternative winter small grain cereal crops are well suited to take advantage of the prevailing winter rainfall and in most cases they can be treated very similar to soft white winter wheat. However, unlike soft white winter wheat the production of these alternative winter small grain cereal crops should not be considered unless the grower has identified a market or outlet for the resulting production. The market for these small grain cereal crops is small to non-existent and thus most production of these crops are either under contracts or for on-farm use as animal feed. Other considerations include:

1. Winter barley production is similar to soft white winter wheat except:
    a. Important barley diseases include barley scald and stripe rust
        i. Few varieties are resistant to both diseases
        ii. Strider is the winter feed barley of choice
    b. Nitrogen fertilization should be 80% of the standard soft white winter wheat recommendation
    c. Pesticides are available but insure that any herbicides, fungicides, and insecticides are labeled for use in barley
    d. Harvest typically occurs in early to mid-July
    e. Barley is also susceptible to the disease take-all and thus is not a break crop for winter wheat
    f. Direct sales to Great Western malting possible but ability to truck deliver is not always guaranteed.
    g. May be opportunity for someone locally to become a marketer, processor.
    h. Expect grain yields in the ~7,000 lb/acre range for conventional and ~ 5,000 lbs/acre organic.

2. Winter oat production is similar to soft white winter wheat except:
    a. Nitrogen fertilization should be 60% of the standard soft white winter wheat recommendation
    b. Pesticides are available but insure that any herbicides, fungicides, and insecticides are labeled for use in oats
    c. Harvest typically occurs in July
    d. Oats are generally the most resistant small grain cereal crop to the disease take-all and can serve as an effective break crop for winter wheat
3. Winter triticale production is very similar to soft white winter wheat except:
    a. Pesticides are available but insure that any herbicides, fungicides, and insecticides are labeled for use in triticale
    b. If a forage type is grown nitrogen fertilization should be 80% of the standard soft white winter wheat recommendation to help reduce lodging
    c. Harvest typically occurs in late July and August
    a. Triticale is susceptible to the disease take-all and thus is not a break crop for winter wheat

Camelina – a fast-growing, oilseed that can be crushed for biodiesel oil

1. Camelina has been grown on poorer quality soils but like most crops will do best on better soils – it likely is not tolerant of very wet soils (south Valley soils in late winter) but experience is limited
2. Late winter – very early spring plantings have been best in field trials
3. Herbicides options are limited but additional registrations are being sought
4. July harvest typical – can be direct combined or swathed then combined- some modifications to combine screens may be needed – typical yields have been 1000-1500 lb/a with current production knowledge
5. Irrigation not required
6. Willamette Biomass Producers (Tomas Endicott – 503-831-1363) is contracting for seed for oilseed crush and can provide planting seed. Corvallis Seed and Feed also has seed available for planting (Dave Lockwood, 541-928-1923)
7. Feed use is limited at this time due to lack of federal approvals. Due to glucosinolate content, camelina meal will always have some limitations unless plant genetics are changed.
8. If used for biofuel, is eligible for state grower production credit of $0.05/lb
9. OSU publication - http://extension.oregonstate.edu/catalog/pdf/em/em8953-e.pdf

Winter canola – if you are outside the ODA established production restricted zone (see http://egov.oregon.gov/ODA/PLANT/canola_summary.shtml)

1. Needs well drained wheat-type soil – tiled/ridged soils may be OK
2. Mid-September planting date best – later planting raises risk for heaving loss
3. Herbicides are available
4. July harvest typical – swath or push down then combine with standard equipment – typical yield should be 3000-3500 lb/a
5. Irrigation not required
6. Willamette Biomass Producers (Tomas Endicott – 503-831-1363) is contracting for seed for oilseed crush and can provide planting seed
7. If used for biofuel, is eligible for state grower production credit of $0.05/lb
8. Crop can be lost to winter injury, may be sclerotinia concern with other broad leaf crops in rotation - http://extension.oregonstate.edu/catalog/pdf/em/em8955-e.pdf

Winter Oilseed Flax – an oilseed crop not well suited for biodiesel

1. Needs well drained wheat-type soil – tiled/ridged soils may be OK
2. Planting dates similar to winter wheat – has better heaving tolerance that winter canola
3. Only locally bred variety is Linore. Foundation seed fields will be planted this fall hence stock seed will not be available in quantity for several years.
4. Herbicides are available – be sure to check labels
5. July harvest typical – can be direct combined with standard equipment
6. Irrigation not required
7. Is not well suited as a biodiesel given its fatty acid profile but If used for biofuel, is eligible for state grower production credit of $0.05/lb
8. May be interest in local food use and local, small-scale crushing for food oil use
9. May be ground and direct fed to poultry at no more than 10% of diet; ground and fed to cattle at no more than 15% of diet
10. North Dakota flax feeding publication – Using flax in Livestock Feeds , Maddock et al http://www.agmrc.org/media/cms/as1283_E9EE897D14437.pdf
11. OSU publication - http://extension.oregonstate.edu/catalog/pdf/em/em8952-e.pdf

Spring Oilseed Flax – an oilseed crop not well suited for biodiesel

1. Needs well drained wheat-type soil – tiled/ridged soils may be OK
2. Late winter to very early spring dates best
3. Are varieties available in Northern Plains states and Canada
4. Herbicides are available – be sure to check labels
5. July harvest typical – can be direct combined with standard equipment
6. Irrigation not required
7. Is not well suited as a biodiesel given its fatty acid profile but If used for biofuel, is eligible for state grower production credit of $0.05/lb
8. May be interest in local food use and local, small-scale crushing for food oil use
9. May be ground and direct fed to poultry at no more than 10% of diet; ground and fed to cattle at no more than 15% of diet
10. North Dakota flax feeding publication – Using Flax in Livestock Feeds , Maddock et al http://www.agmrc.org/media/cms/as1283_E9EE897D14437.pdf
11. OSU publication - http://extension.oregonstate.edu/catalog/pdf/em/em8952-e.pdf
12. North Dakota 2007 publication - http://www.ag.ndsu.edu/pubs/plantsci/crops/a1038w.htm

Meadowfoam - winter annual grown for the oil extracted from the seed.

1. Grows on many types of soils. Tolerates poorly drained soils currently used to grow annual ryegrass. Plants can tolerate flooding if half the plant is above the water surface.

2. Planting dates: October 15th on poorly drained soils or planting after tillage. Yields equal or exceeding October plantings can be achieved if planting no-till to mid-November on well drained or hilly soils.

3. A variety of soil preparation methods can give good establishment. Full tillage may be required if incorporating straw, and/or following large crown grasses such as tall fescue. Light disking and rolling alone suffices if straw is bailed and you are following small crown grasses such as perennial ryegrass. No-till planting works well but requires bailing straw if planting in mid-October. If planting no-till in mid-November you can plant into a full straw load. Straw should be flailed twice after harvest (to 3-4 inches in length) and left to settle and degrade.

4. Herbicides for grass and broadleaf control are available, although options are limited. If planting in mid-November an additional glyphosate application is usually required in the latter half of October to control the early grass sprout.

5. Minimal fertilizer is required if the crop is grown following a perennial grass seed crop. Usually there is sufficient nitrogen carry over from the preceding grass crop to supply much of the N need. On heavy soils, or if planting in mid-November some growers add 10-15 lbs of N at planting. Late winter N applications are in the range of 20 – 40 lbs per acre.

6. Bees are required for adequate pollination. Two healthy hives per acre are necessary and should be disbursed around the field as much as possible. Where this is not possible some growers place hives in the middle of the field at the cost of some crushed plants.

7. On the valley floor typical harvest is the last week of June, and about a week later at higher elevations. Harvest is usually by swathing and threshing. Some growers have experimented with direct harvest. Minimal residue remains after combining.

8. OSU meadowfoam varieties are exclusively licensed to OMG -Meadowfoam Oil Seed Growers Cooperative, Inc., an open enrollment Cooperative Corporation. Other options for growing meadowfoam may be available through Technology Crops International.

9. For further information see publication, Growing Meadowfoam in the Willamette Valley, OSU Extension Publication EM 8567. http://extension.oregonstate.edu/catalog/pdf/em/em8955-e.pdf

Safflower – a cool-season oilseed crop

1. Needs well drained wheat-type soil – tiled/ridged soils may be OK
2. Late winter to early spring planting dates
3. Spring-type seed available from other parts of the US – winter types are being developed.
4. Herbicides are available – be sure to check labels
5. September harvest typical – work at Pendleton suggests that earlier harvests than typically thoughts may be possible - can be direct combined with standard equipment
6. Irrigation not required but will result in yield increase
7. Yields in trial work to date have been @1000 lb/a yield in dryland and 2000 under irrigated conditions
8. Is eligible for state grower production credit of $0.05/lb
9. May be interest in biofuels contracts and local food crush
10. Older OSU publication is available - http://extension.oregonstate.edu/catalog/pdf/em/em8792-e.pdf

Soybean – a warm-season, nitrogen fixing oilseed crop

1. Irrigation required for production but level is likely less than for other irrigated crops such as sweet corn and green beans
2. Determine market – biofuel or food grade
    a. Biofuel - Willamette Biomass Producers (Tomas Endicott – 503-831-1363) is offering contracts for production on Non-GMO soybeans
        i. Problem, lack of knowledge on non-GMO soybeans other than Malheur Experiment Station Soybeans in the Willamette Valley
        ii. Variety trial of non-GMO soybeans is needed for Willamette Valley to identify if a good variety can be found and increase Malheur Experiment Station varieties of known success.
    b. Food grade – market would need to be found and clear hilum soybean seed used. Non-GMO is again a likely requirement
        i. Successful production has been accomplished in Willamette Valley by Stan and Michelle Armstrong (503-710-8465) using Malheur Experiment Station clear hilum soybeans.
        ii. Problem, no additional availability of Malheur Experiment Station soybean seed.
3. Draft guide on soybean production in Oregon is available upon request to Steve Norberg. Plans are in place to web publish as soon as possible.
4. Shares a common disease complex with other legumes and broadleafs – rotations among broadleafs will need to be carefully considered

Sunflower – a warm-season seed or oilseed crop

1. Can be grown on an array of soils
2. Warm-season so early spring seeding – similar to sweet corn
3. Seed available in other parts of the US
4. Herbicides are available – be sure to check labels
5. September harvest typical – would likely need row header on combine
6. Irrigation not required but will result in yield increase
7. Yields in trial work to date have been @450 lb/a yield in dryland and 1900 under irrigated conditions
8. Is eligible for state grower production credit of $0.05/lb
9. May be interest in biofuels contract, local food crush or possibly pet seed contracts – fiber?
10. Sclerotinia can be a major problem – see ND pub http://www.ag.ndsu.edu/pubs/plantsci/rowcrops/pp1193w.htm

Teff – a warm-season, annual forage grass - doubtful seed crop in the Valley

1. A fast, growing forage grass of African origin – seed is quite valuable but odds are against mature seed production in the Valley
2. Early spring planted after threat of frost is past
3. Irrigation required for production – but may be less than other irrigated crops such as corn and green beans
4. Hay equipment needed
    a. Small square bales for horse market is generally wanted
    b. Large square bales for other markets
5. Determine market
    a. Sell directly to horse hay market
    b. Sell to hay buyers
6. Is current production in the Hermiston, Klamath and Ontario areas
7. No herbicides currently registered but an attempt will be made by IR-4 prior to next cropping season.
8. Guide sheet on teff is available see: http://extension.oregonstate.edu/catalog/pdf/em/em8970-e.pdf

Soft White Winter Wheat

Soft white winter wheat is commonly grown throughout the Willamette Valley. It is well suited to Willamette Valley environments with yields commonly exceeding 140 bushels per acre. A wealth of knowledge on the production of soft white winter wheat is available through local extension agents, extension publications, and websites. Growers considering soft white winter wheat production should understand that the key to profitability is containing input costs. Additional points to consider include:

1. Soft white winter wheat prefers well drained soil
    a. Production on poorly drained soils is possible with tile drainage and/or ridge till (see *FS 269, Growing Winter Wheat on Poorly Drained Soil*)
2. Seeding is recommended after October 15 to avoid aphid born diseases
3. Variety selection is critical to maximize yield and reduce disease risk
    a. Goetze and Tubbs 06 are the most commonly grown soft white winter wheat varieties in western Oregon (see *EM 8957-E, Goetze: soft white winter wheat*)
    b. OSU statewide variety trial results are available at http://cropandsoil.oregonstate.edu/wheat/state_performance_data.htm
4. Controlling disease and insect pests is important
    a. Septoria and stripe rust are the most common diseases
    b. Aphids, cereal leaf beetle, and slugs are important insect pests
5. Controlling grass and broadleaf weeds is important
    a. Many herbicides are available for use in soft white winter wheat
6. Proper fertilization is required for efficient utilization of nutrients
    a. Nitrogen is the most important plant nutrient for soft white winter wheat (see *EM 8963-E: Soft White Winter Wheat Nutrient Management Guide for Western Oregon*)
7. Irrigation is not required
8. Harvest typically occurs in late July to early August
    a. Late season rains may cause sprout damage if harvest is delayed
9. Wheat can be delivered directly to Portland
    a. May be some delays depending on export demand
    b. May also deliver to elevators in eastern Oregon (The Dalles, Biggs etc.)
    c. May be possible to capture low protein premiums
10. On-farm storage is possible
11. Other outlets includes use as an animal feed
12. The disease take-all is a major concern when wheat is grown continuously without rotation for 2 to 5 years (see *EC 1423-E, Combating Take-All in Western Oregon*)