ALTERNATIVE CROPS FOR THE COLUMBIA BASIN: RESOURCE

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PREFACE

For several years the ability to farm the lands of the Columbia Basin profitably has been diminishing. There are many reasons for this, among which are that the consistently low grain prices have not kept pace with the increases in costs of farming. Labor costs, the price of new machinery, of fertilizer and pesticides, of transportation, accounting, and heavy brokerage fees, have all combined to cause many wheat ranchers to look for new sources of income.

The purpose of this report is to explore some of these possibilities. They include but are not limited to **OILSEED, FOOD, FORAGE, SEEDS AND STEMS FOR REVEGETATION, CROPS WHICH ENRICH THE SOIL AND/OR REDUCE THE THREAT OF DESEASE TO THE PRIMARY CROPS.**

During the course of investigation of these possibilities, inquiries have been made into products of other nations, of lands with similar soils and rainfall. A search of native plant species which might show promise has been conducted, with experts in the field involved. Please see the bibliography and reference material section.

For purposes of clarity the format which is being used is separated into three categories. **GRASSES AND CEREAL GRAINS, BROADLEAVED HERBS AND FORBS, and SHRUBS AND TREES.** Each of these have alphabetical indexing of common names. There is as well a central index of common and scientific nomenclature.

While no expectation is offered that this is exhaustively researched, it should provide those who are searching for other crop choices for the Columbia Basin, a considerable pool of possibilities. As well, there are Oregon State University Extension Service bulletins and continuing data on many of these subjects.

A few caveats: There may be some species listed that sound very promising, and there is a temptation to abandon present use of land, plunging totally into new crops. History has shown us that there is considerable risk attached to doing this. Unless all aspects have been thoroughly researched, problems might surface. If an oilseed crop is raised, for which there is no processing plant to accommodate it, or if a crop is raised that is either a controlled substance or a noxious weed, there might be complications.

Remembering that everything is connected to everything else, we need to look at all aspects of each new venture. This being said, there are some promising possibilities on the horizon.

ACKNOWLEDGEMENTS, BIBLIOGRAPHY, AND REFERENCES USED.

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Tim Butler, ODA Weed Division
Bruce Newhouse, Native Plant Society of Oregon
Sam Wilkins, ODOT
Dr. Richard Old, University of Idaho
Bruce Barnes, Native Plant Society of Oregon
Berta Youtie, The Nature Conservancy
Dr. Kenton Chambers, Dr. Scott Sundberg, Dr. Aaron Liston, Oregon State University

Milestone Nurseries, Lyle, Washington
Dry Creek Seed Co., Mosier, Oregon
Amazing Grains, John Sheldon, Boseman, Montana
GROWISER, Andy Huber, LaGrande, Oregon
Wallace Hansen, Native Plants, Salem, Oregon

And the continuing help of all the County Extension Agents throughout the Columbia Basin.

INDEX

INDEX OF SCIENTIFIC NAMES

GRASSES AND CEREAL GRAINS

Barley
Brome
Durum Wheat
Einkorn
Emmer
Fescue
Hesperaloe
Junegrass
Kamut
Needlegrass
Oats
Rye
Rye Grass
Reed, Indian
Ricegrass, Indian
Spelt Wheat
Squirreltail
Sudan Grass
Triticale
Timothy
Wheatgrass, Bluebunch
Wildrye, Basin
Wildrye, Blue
Millet

Barley (*Hordeum vulgare*) is an important cereal grain in the U.S. It is used for livestock fodder, the brewing industry, and for some bread-making. It is best suited in our Columbia Basin as a crop to follow winter wheat. It is of limited acreage and not likely to become a high value crop.

Photo: http://plants.usda.gov

Brome, Columbia (*Bromus vulgare*) is a native grass whose seed is harvested for revegetation after fire or other disturbance has degraded an area. It is well suited to prevent erosion and helps to exclude noxious weeds. At present the only significant source for this seed is that which is hand-harvested from wild stands. Agencies are the principal purchasers. If sufficient commitments could be obtained it world be a profitable crop to grow in many niche areas of the Columbia Basin.

Photo: http://plants.usda.gov

Durum Wheat (*Triticum turgidum*) is the plant from which seminola is derived. The flavor and cooking qualities of durum pasta are superior, and durum seminola is preferred in the production of pasta products, such as spaghetti, macaroni, and couscous which is the staple food of North Africa. Durum is suited to our Columbia Basin climate and moisture. It is a high-value commodity, and has a place in our wheat production.

Einkorn (*Triticum monococcum*) is a wheat that does not compare in quality to modern wheats, but can be cultivated in harsh environments and poor soil to produce protein and yield equal to or higher that barley and durum wheat when grown in similar adverse conditions. If climate change should impact the Columbia Basin severely, this might be one of the alternatives.

Photo: http://dialspace.dial.pipex.com/town/plaza/hg20/ancer.jpg

Emmer (*Triticum diococcum*) was grown throughout the U.S. in the early 1900's, Emmer is another grain that can stand less than favorable growing conditions. It is grown for grain that is used for cattle feed, replacing either oats or barley in feedlot rations. Some bread is made from emmer.

Photo: http://plants.usda.gov

Fescue, Idaho (*Festuca idahoensis*) is a native bunchgrass of the Columbia Basin that once covered thousands of acres on both sides of the river. Intense grazing by cattle and sheep in the early days of settlement of the west reduced its occurrence to a small fraction of what it was. It is in great demand for restoration projects where land has been degraded by fire, overgrazing, or disturbance. Agencies such as U.S.F.S. or U.S.B.L.M. are the usual markets, but also State Parks, and Highways, and some counties are purchasers as well. In our area Idaho fescue grows best on north-facing slopes, and where grazing does not occur it can form dense stands and produce profitable amounts of seed. At present much of what the agencies purchase come from hand harvested seeds from native stands, but with market commitments it should be possible to grow commercial crops for seed.

Photo: www.yuccado.com

Hesperaloe (*Hexperaloe funifera*) is a native of Mexico. It produces fiber bundles that are used locally in Mexico for cordage products. They also have potential for production of paper with exceptional tensile and tear strength. This would lend itself to specialty products such as currency paper, bible pages, tea bags and filters. Blending with other fibers could increase the strength of other paper products such at tissues and towels. Hesperaloe is not grown commercially in the United States. Test plots in Southern Oregon showed promise. Much of the Columbia Basin has similar soil and moisture to areas where it is grown in Mexico.

Junegrass, (*Koeleria macrantha*) is a native bunch grass that was once widespread throughout the west. It is considered an indicator of land with lesser disturbance. It is one of the principal native grasses desired when revegetating lands after fire, overgrazing, or other disturbance. It is also an attractive bunchgrass for landscape plantings. Junegrass will grow almost anywhere in the Columbia Basin, but does better where rainfall exceeds twenty inches. Harvesting of the seeds is somewhat challenging, and generally is done by hand, so this is definitely a niche market item.

Kamut (*Triticum turgidum*) is a specialty wheat that is marketed through Health Food outlets. Kamut products include whole grain flour, breads, hot and cold cereals, pasta, and chips, in addition to green plant dehydrated product. Kamut products have a mild nutty flavor. Individuals who experience allergic reactions to products made from common wheat can tolerate kamut.

Needlegrass (*Achnatherum sp.*) is a genus of bunchgrasses that have several species, which are native to the intermountain west. It produces a gluten-free seed, which can be used to make gluten-free bread. A large segment of our population suffers from gluten intolerance. This might prove to be a good niche crop, along with Indian Ricegrass, which has similar properties. Needlegrasses grow well throughout our area, handling our temperatures and moisture levels well. It is also suitable for forage, though its sharp tips make it less desirable for this purpose.

Oats (*Avena sativa*) are so commonplace that they are seldom thought of as an alternate crop. Oats have been grown for a very long time as livestock feed, as oatmeal for human consumption, and the vegetative residue for straw used as bedding and other miscellaneous straw uses. They have been grown in the Columbia Basin from early days of settlement. They were considered much more important when draft animals were required for farm power. It is not likely that additional acreage of oats is required in the foreseeable future.

Rye (*Secale cereale*) was once used widely as a cover crop, and for forage or hay. It is considered a contaminant in a wheatcrop however, and reduces the value of wheat which contains rye seed. It is important that control measures be used to prevent this aggressive grass species from invading where it is not wanted. That being said, in non-wheat growing areas there may be a role species. Hybridization of wheat and rye have given us very vigorous yields. Further study is suggested.

Rye grass (*Lolium perenne*) is available as both an annual or a perennial grass. Both are used as a forage crop as pasturage. There is some demand for perennial rye as a turf grass. For a rapidly available pasture, and mixed with legumes, perennial rye grass can be grazed within 8 to 10 weeks of seeding. It prefers higher annual rainfall than usually found in the Columbia Basin, but with supplemental irrigation, it can do very well. Annual rye grass has higher moisture requirements, and is less adaptable to hot or cold period.

Indian Reed (*Phragmites communis*) is a very tall native grass that grows in riparian areas, and to a lesser degree in swales and hollows. It has been used for a very long time because of its strong fibrous leavers, and the long straight shafts of the hollow stems. Since it has been introduced along the eastern seaboard it has become a noxious invader, but here in the Columbia Basin it simply fills its own niche. Much like Indian Hemp, a small market for this historic fiber might be found.

Indian Ricegrass (*Oryzopsis hymenoides*) is a bunchgrass that is native from the Dakotas south to Texas and west to the Pacific Ocean. It is adapted to dry sandy soils and is quite drought resistant. It is a bunchgrass, growing in clumps that are up to two feet tall. Livestock prefer this plant, which has been severely over-grazed throughout its range. This is an important species for reseeding rangelands, and there is presently a market for its seed. The seeds of ricegrass were formerly used by Indians for grinding into meal and making bread. We have found in recent years that use of ricegrass flour in a gluten-free bread is attracting an increasing market. AMAZING GRAINS Grower Cooperative, out of Montana, has shown an indication of the success of this product. Gluten-free grains target millions of consumers who suffer from gluten intolerance. People with this genetic autoimmune disorder react to the gluten proteins in wheat, barley, rye, and numerous other cereal grains. Use of gluten-free grains can control the effects. The response has been very favorable. Recent tests in Sherman County and Umatilla County indicate that we have soils suited to crops of this native grass.

Spelt wheat (*Triticum spelta*) is a winter wheat that is suited to the Columbia Basin. It is used as an alternative feed grain to oats and barley. It can be used in flour to replace soft red winter wheat. It has characteristics to make it desirable for pasta and high fiver cereals. There is cultivation of spelt wheat in the U.S.

Squirreltail (*Elymus elymoides*) is a native bunchgrass that is indicative of a relatively undisturbed habitat. Sometimes called Bottlebrush, and formerly named *Sitanion hystrix*, this grass has never been popular with cattlemen, because of the short period of time that it is suitable for grazing. Once the long awns begin to dry it becomes unpalatable. Nevertheless, as a revegetation species for disturbed lands, it has good acceptance. It is quite attractive in native gardens as the grass begins to ripen. It is easy to grow almost anywhere in the Columbia Basin. Harvesting is done by hand, so it is a labor-intensive crop, but agencies such as state parks, and highway departments are the market, with a fairly steady demand.

Sudan Grass (*Sorghum sudanense*) has been grown as a cover crop since the 1940's in parts of Oregon. It is a summer annual for pasture, silage, or hay. It is planted as a cover crop at the end of the summer following short season potatoes in the Columbia Basin. When used in this manner it is allowed to grow six or seven feet tall and then disked into the soil. It is grown sometimes in rotation with canola. It is very tolerant to herbicides and is one of the crops that can be planted in fields that have high residuals of herbicides. Its ability to reduce wind erosion gives it additional value.

Triticale (*xTriticosecale Widdmark*) is the stabilized hybrid of wheat (Triticum) and rye (Secale). It can be grown in areas where wheat performs poorly. Some of the Columbia Basin meets this description. Generally triticale is considered of inferior quality to bread-making wheat, and to durum wheat for macaroni, but is considered superior to rye. It is used primarily for livestock feed. In Mexico triticale is used for whole-grain breads and tortillas. In the U.S. there is a small market for pancake mixes and crackers. Triticale also finds favor in ethanol production, because of more efficient processing than barley and some other ethanol producing species.

Timothy (*Phleum pratense*) is an annual grass that is a companion crop with alfalfa. It thrives in areas where there is sufficient rainfall (20 inches or more). Where two cuttings per season are possible it becomes a profitable crop. Sometimes timothy is grown as the sole species and used as a part of forage mixes. It is one of several grasses that can be grown with supplementary irrigation.

Bluebunch Wheatgrass (*Pseudoregnia spicatum*) is possibly the most significant native bunchgrass in the Inter-mountain West. Vast areas, including much of the Palouse country, were covered with this bunchgrass. As a soil stabilizer, especially in the loess, or windblown soils, that occur throughout the Columbia Basin, Bluebunch Wheatgrass was without equal. Tens of thousands

of cattle, and even more sheep have overgrazed its habitat until few high quality stands remain. Once Cheatgrass (*Bromus tectorum*) moved into the vacuum thus caused, its chances of naturally recurring are minimal. Bureau of Land Management attempts at salvaging denuded lands included introduction of Crested Wheatgrass (Agropyron cristatum), an exotic which has been disappointing at best. Recently this agency has done some work reintroducing Bluebunch Wheatgrass with encouraging results, but the challenge in number of acres is formidable. Nevertheless it has created a market for the seeds of this species to be used as a native grass for revegetation after wildland fires and other land disturbances. Ongoing development shows that there could be a sustained market.

Basin Wildrye (*Leymus cinereus*) is the most remarkable native bunchgrass in eastern Oregon and Washington. The sheer size is very striking. In most years it is five or six feet high, and in good years it may reach nine feet tall and each plant three feet across?. Many of the lowland meadows in the intermountain west had thick stands of this grass when Euro-Americans arrived. Because this species decreases under heavy grazing regimes, the arrival of large numbers of domestic livestock in the 1860's began the decline of Basin Wildrye communities. Now it is considered one of the rarest plant associations in the intermountain west. It grows best in deep soils that are subirrigated or receive runoff from upslope. Gullies, swales, and bottoms are the place where it continues to thrive. It tolerates saline to alkaline soil conditions that occur in our area. Basin Wildrye stands provide exceptional cover for a number of wildlife species. Deer, birds, and small mammals use the stands for nesting, hiding, and foraging. Bureau of Land Management, Forest Service, and Fish and Wildlife Service are beginning to pay more attention to this species. The fibers of the plant were used by Paiutes and other tribes for many purposes. Some Native Seed Companies are harvesting these seeds for revegetation sites. Growing it commercially should be investigated further.

Blue Wildrye (*Elymus glaucus*) is a native bunchgrass that thrives in the Columbia Basin. It especially does well where annual rainfall is above 20 inches, but shows up on north slopes even in desert areas. It is another of the native perennials that livestock have been partial to. As with some of the other bunchgrasses, agencies are using this one to revegetate land degraded by fire or grazing. There is a small market presently, but with commercial production that market could expand.

BROAD-LEAFED HERBS AND FORBS

ASPARAGUS
ASTER
BEAN:COMMON OR FIELD
BEAN: FAVA
BEAN: MUNG
BEAN: LIMA
BUCHWHEAT
CACTUS
CANOLA
CARROT
CRAMBE
CUPHEA
DAIKON
DAGGERPOD
DESERT-PARSLEY
DILL
EVENING-PRIMROSE
FENNEL
FLAX
FLOWERS, MISCELLANEOUS
GARLIC
GINSENG
GOURDS
GRAPES
GUMWEED
HEMP
HERBS FOR COOKING
HORSERADISH
INDIAN HEMP
JERUSALEM ARTICHOKE
LENTIL
LUPINE
MEADOWFORM
MUSTARD
ONIONS
PEAS: FIELD
PEAS: BLACK-EYED
PEAS: GRASSPEA
PEAS: CHICKPEA
PENSTEMON
PEPPERMINT
PEPPER: CHILI, TABASCO, HABANERO
PUMPKIN
RAPESEED (CANOLA)
SAFFLOWER
SALSIFY
SOYBEAN
SPURGE
SUNFLOWER
SUNN HEMP
VERNONIA
WATERMELON
WORMWORD
YARROW

Asparagus (*Asparagus officinalis*) is a perennial crop with rhizomes that produce edible stems each spring. With good care and in a desirable habitat a plant will produce for up to twenty years. It is a plant that is tended and harvested by hand, so it is very labor intensive. It requires some irrigation, even though it is harvested in the spring before hot weather.

Asters including (*Macharanthera canescens*) are good possibilities for sale to those wanting native plant gardens. This particular one will start blooming in September and continue through to December. It is a native to the inter-mountain west and is very showy. It is easily grown from seed with a minimum of care. A small acreage could produce seeds of good value.

Beans: Common (*Phaseolus vulgaris*), of which white, pinto, pink, red, and kidney are typical examples. Green beans harvested early for canning, fresh, or for freezing are more commonly grown in the Willamette Valley where rainfall is greater. Beans in the Columbia Basin are harvested later, and windrowed to dry the beans. While yields are sometimes good, harvesting is difficult with inevitable losses due to shattering. Weeds are a problem too, and one should think carefully before putting in acreages of beans. That being said, Washington gains about 20 million dollars in bean crops annually, so for some it is a good crop.

Bean: Fava (*Vicia faba*) is a native of Europe. It can be used for both animal and human consumption. Production is limited, due to inconsistent yields and poor market opportunities. A more humid climate than the Columbia Basin is required for good production.

Beans: Mung (*Vigna radiata*) are normally grown for bean sprouts as a niche market. Other species are alfalfa, daikon, and clover sprouts. Sprout-growers purchase seeds from producers who might get some extra income from an idle corner of their land.

Beans: Lima (*Phaseolus lunatus*) are a bush bean that lend themselves to similar methods of production as peas. Mechanical harvesting is difficult due to weed contamination. Irrigation is necessary. If these requirements are met, this is a dependable cash crop.

Buckwheat (*Fagopyron sp*) is a short season crop that can be planted following wheat or potatoes. A 75 day growing season is typical. The market is limited in the United States, where some is ground into flower and added to baking mixes. Some is exported to Japan where it is made onto soba noodles.
Buckwheat, Native (*Eriogonum sp.*) of several species grown throughout the Columbia Basin. It can be a very showy wildflower in April and May. It is popular with native plant gardeners and there is some demand for both seeds and starts. Since nearly all of our area will support this plant, it becomes one of the dryland or xeric gardening options.

Cactus (*Opuntia fragilis*) called Prickly-Pear is a native plant that grows from Arizona to Montana, and west to the Cascade Mountains. Dryland or xeric landscaping is becoming increasingly popular. With rising costs of water for irrigating lawns and backyards, homeowners are going to low maintenance species. This is one. Cactus are easy to grow from broken-off lobes and there is a small steady market. A bunchgrass and cactus accent is attractive, and could spell profit to a landowner.

Canola or Rapeseed (*Brassica napus*) is a member of the mustard family. It has shown promise in our area as a rotational crop. Besides the value as an oilseed, it provides erosion control, and reduces disease problems in cereals and legumes that are planted alternately. It's value as an oilseed crop is found in commercial cultivars with improved fatty acid compositions which make it attractive as an edible oil. Aside from home use of canola oil in salad dressings, margarine, and cooking oil, some restaurants and fast-food outlets use large amounts in deep-frying chicken, French-fries, and donuts.In recent years this cooking oil, when no longer usable, has been recycled by pioneers in a cottage industry producing bio-diesel. This burns as a fuel in unmodified diesel engines with good result. This has led to thoughts of growing a crop which in itself would be dedicated to the production of bio-diesel. There is much promise for its competitive cost if it were produced in quantities which would lend to economies of scale.

To gain the full advantage of rapeseed, the cultivar is preferred which favors being sown in the fall and flowering in springtime, before irrigation is necessary. The Columbia Basin has soils and rainfall conditions which allow for the cultivation of this plant. As with any alternate crop, some trial and error has occurred and profitable results are not guaranteed.

The many uses it can have are encouraging. It can be used for industrial oil for producing synthetic lubricants, varnishes, and plastics.

After crushing and extracting the oil, the mealy residue can be used as a feed supplement for livestock. It has a high protein content and is valued for this. Winter rapeseed can produce 10 to 20 metric tons of dry forage per nectar, with 9% to 12% protein levels.

When used as a compost on fallow lands it can suppress soilborne pathogens of cereals, potatoes, and legumes.

Whole rapeseed is exported to some Asian markets, including Japan. Small domestic markets exist for industrial rapeseed.

In an overview of the many uses of this oilseed plant, it appears that it could be one of the most significant non-cereal grain crops for our area.

Carrots: fresh, for processing, or for seed (*Daucus carota*) presently an important crop in the Columbia Basin, should be noted in this discussion. Carrots are a fresh market vegetable with wide acceptance. Processed carrots found in many prepared foods, are the largest market. Carrot waste from processing is used in dog food. In addition, half the carrot seed production in America occurs in the Columbia Basin. Before planting acreage to carrots research of the field should be done.

Crambe (*Crambe abyssinica*) is a native of Ethiopia. It produces an oil that is used in the manufacture of synthetic oils as well as non-petroleum based plastics. It has been successfully grown in North Dakota and its climate demands are such that it could probably do well in the Columbia Basin. Though tests in Moscow, Idaho showed that there were some problems with growth and harvest, perhaps the biggest problem is that there are no oilseed crushing facilities in this region. Were that remedied we could have several other promising oil crops.


Photo: www.desert-tropicals.com/plants/Lythraceae/Cuphea_hyssopifolia2.jpg

Cuphea (*Cuphea species*) with more than 260 species growing from South America to the United States, is now being tested in fields of Iowa and Minnesota. It could be that the Columbia Basin might do as well, or better. The plant produces an oily seed containing a high level of lauric acid, an ingredient used in the detergent industry. Detergent maker Procter and Gamble has funded some of the research and is looking for a domestic source of the plants. They say they could use a million acres or more for the oil that could be used for products ranging from toothpaste to body lotion. With high demand for the oilseed crop, the research is on the fast track and should be considered a promising one for our area.


Photo: http://plants.usda.gov

Daggerpod (*Lesquerella fendleri* or *L. douglasii*) is a perennial plant of the mustard family. It has a seed oil that is high in hydroxy fatty acids. The oil is used for specialty lubricants, heavy duty detergents, inks, and coatings. The plant is well adapted to semi-arid locations, growing from Arizona to Washington in the inter-mountain west. As a crop it can be grown as an over-wintering annual and harvested before irrigation is required in the spring. Though it is not being grown commercially, small plot studies have been done in southwestern Oregon.

Daikon (*Raphanus sativus*) also called Chinese radish, is typically a late summer or early fall crop. It is planted in July and harvested several months later. Because of this, some irrigation is necessary. It is used as a garden vegetable, but as well it can be grown for sprouts and so a demand for daikon seed exists. Sprouts are grown in greenhouses and are cropped continuously all year, so a steady demand for seeds exists. Alfalfa, daikon, and clover sprouts comprise the largest volume of the sprout market.

Desert-parsley (*Lomatium sp.*) occur as native plants, with as many as 25 species in our area. A wildflower of early spring, many of the species are sought-after for gardening and land restoration projects. *Lomatium minus* and *L. cous* are often blooming by the end of January in Wasco, Sherman, and Morrow counties. Others come continuously until mid-summer. If their attractiveness were their only virtue, this would be sufficient, but their history as food crops for Indians is significant. Many have an enlarged root, which stores nutrients. These were dug and dried for use. Fern-leaved desert-parsley has medicinal properties that are being exploited by herbalists. It would be of two-fold value to grow as farm crops those in greatest demand. It would prevent destruction of native populations, and provide a niche-crop for profit.

Dill (*Anethum graveolens*) is grown as a fresh herb, dried herb, seed for oil, or seed for a condiment. Dill is an annual crop that is planted in the spring and it matures in about 65 days. It is a plant for the fresh market or if produced for oil it is steam-distilled using the same facilities as those for mint.

Evening-Primrose (*Oenothera caespitosa*) is grown for its oil, which is used in cosmetics and pharmaceuticals. It is not approved for use in the United States but has a ready market overseas. It is presently grown on a few hundred acres in east-central Washington. So far great care has been made to assure the correct varieties for good oil production. Be aware that *Oenothera caespitosa* is a widespread native evening-primrose throughout the inter-mountain west.

Photo: http://vitamins.com/VitHealthNotes/HN75_Spanish/Es-Herb/Fennel.jpg

Fennel (*Foeniculum vulgare*) is a tall hardy aromatic perennial of the parsley family that is native to the Mediterranean area. In appearance it is much like dill, but with a distinctively different flavor. This plant is grown for its seed and essential oils. The seed is used as a spice in cooking, and the oil is used in condiments, soaps, creams, perfumes, and liqueurs. Some fennel is grown in the central valley of California, but with requirements similar to dill, it could be grown in the Columbia Basin.

Flax (*Linum usitatissimum, L. Perrine*, and our native *L. Lewisii*) has been grown in Oregon from pioneer times. This plant, which produces fibers for linen cloth, as well as linseed oil, has experienced a long period of popularity as a multi-use crop. With the advent of petroleum based fibers (rayon, nylon, et. Al,) and the much wider use of cotton for fabrics, flax has become a minor player. Worldwide there is still use of both linen and linseed oil among third world countries, but the profitability for Columbia Basin farmers would appear to be low. This is not to say that there is no place for flax in a niche market, for flax grown in Oregon can be made into fine linens for clothing, draperies, furniture, and some canvases. The crop may have value in rotation to reduce problems of weed control, disease, and insect cycles.

Photo: Stephen Machado

Flax grown for linseed oil, and used in paints, furniture polishes, wood finishes, etc. has a moderate but steady demand. Continued studies of varied uses of this oil are called for. Linola is flax bred for edible oil (low in linolenic acid, high in linoleic acid) similar in composition to sunflower, safflower, and corn; meal after oil extraction is valuable for protein and energy for animal feeding; seeds are golden yellow.

Flowers: Miscellaneous including (*Coreopsis sp. Gaillardia sp. Centaurea cyanus et. Al.*) A market has developed for what are loosely called “wildflowers”. Seeds of quite a number of what would typically be called roadside plants are grown, packaged, and distributed as alternatives to horticultural varieties for backyard gardens. While purists and conservationists spurn these, preferring truly appropriate native plants, there is still a significant market for these seed packets. Be aware that to produce them responsibly, they should be completely weed-free. This can be a labor-intensive process but it is a definite niche market.

Photo: www.lvsvalu.kfunigraz.ac.at/~katzer/pictures/dill_05.jpg

Garlic (*Allium sativum*) is a high-value crop, though with a limited market. Usually small acreages are planted due to the fact that is a very labor-intensive crop. It is weeded and harvested by hand. It is propagated by bulbils or cloves that are planted in the fall for over-wintering or can be spring planted. Irrigation is a usual requirement for this plant, but an acre of good soil properly managed can produce $5,000 or more gross income. Because garlic and onions are closely related, farming methods are similar.

Photo: http://plants.usda.gov

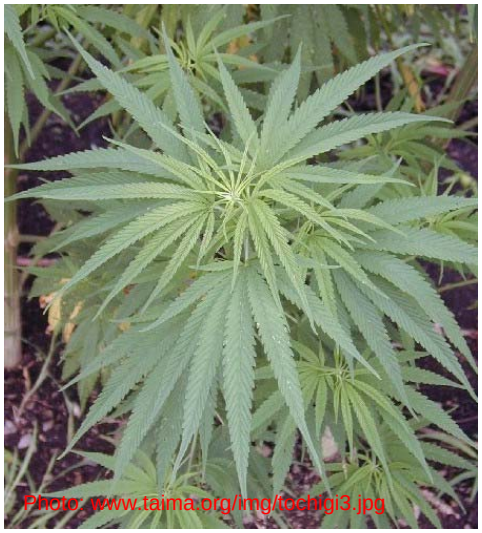
Ginseng (*Panux quinquefolius*) is an Aralia family perennial herb grown for its root that is used primarily in Asian countries for medicinal purposes. It takes four years to mature, so it is not a crop to enter into lightly. Our native wild ginseng is not harvestable because it is a rare listed species. Commercial cultivars are in limited availability. Check with Department of Agriculture for additional information.

Gourds (*Luffa acutangula* and *L. cylindrical*) are members of the Cucumber family and are vines that produce edible fruit. Gourds are consumed as a vegetable when the fruit is young and the rind is soft. As it ages the rind becomes hard, and the fruit is inedible. Gourds are produced for decorative purposes. Growing them is similar to growing melons and cucumbers, so irrigation is required. There is limited acreage at present.

Grapes (*Vitis vinifera, et. Al.*) have become a major Columbia Basin crop, for the production of wine that has met with worldwide approval. It takes three years before a vineyard is in even limited production and is labor-intensive. Irrigation is preferred for this initial period, but many acres of dryland grapes are doing well in our area. Be aware that sometimes success is its own worst enemy, and recent overplanting and wine production has depressed the market.

Gumweed (*Grindella sp.*) is a plant of the Composite family that grows commonly on roadsides and dried beds of vernal pools east of The Dalles. It thrives on hot dry summer conditions. Our native *G. squarrosa* and *G. volumbiana* are widespread. *G. camporum* which occurs in the California central valley has had some commercial work done with it. Resins have been patented for use in adhesives, rubber coatings, textiles, and polymers. Grindelia resins are a potential alternative source to provide products like fatty acids, rosins, and turpentines. Wood rosin, formerly obtained from old-grown pine stumps, is not now available, and this could be a promising source.

Herbs for cooking: **Anise, Basil, Burnet, Caraway, Catnip, Chamomile, Chervil, Chicory, Chives, Coriander, Cress, Marjoram, Oregano, Parsley, Rosemary, Saffron, Tarragon, Thyme**. These are but a few of the many herbs that a herb garden might contain. This is a labor intensive limited market but cooks keep using herbs.



Hemp (*Cannabis sativa*) has been cultivated for a source of strong stem fibers, seed oil, and psychoactive drugs, for many centuries. As our supply of wood fiber diminishes, there has been an increased interest in hemp as a fiber for paper, textiles, and composite wood products. Historically hemp was used mainly for cordage. It has been largely replaced by relatively inexpensive cotton and synthetic fibers. Hemp has been classified as a controlled substance in the United States since 1937, due to the use of strains cultivated for the drug marijuana. At present in many other nations the cultivars that are low in psychoactive properties are being grown for fibers as well as oilseeds. Further development of this crop will not be made until legislative restrictions are removed from it. The Columbia Basin is not a prime location for the high yield of this plant, due to its need for more moisture. Some irrigated areas might do well, but dryland crops would not appear to be promising.

Indian Hemp (*Apocynum cannabinum*) is a native plant of the dogbane family. It grows at lower elevations in the Columbia Basin. While it tends to need more moisture than its related *apocynum androsamaefolium*, it could be grown in niche areas throughout our range. Tribes from very early times used Indian hemp twine, and the best stands of plants were carefully guarded secrets. It was gathered in late summer and buried in damp earth. Alternately, it could be left until October, the stalks crushed to which were then twined to make nets, baskets, fishing line, and many other articles. These fibers compare favorably to hemp or flax, and a niche market for such an historic Great Basin fiber might be found.

Horseradish (*Cochlearia armoracia*) is a garden vegetable that is respected as a condiment. Historically it has been used for three thousand years, for medicinal properties as well as delighting jaded palates. It has been cultivated in the United States for over 150 years. It has been cultivated in the mid-west and on the Oregon California border on a commercial scale. Over 6 million gallons of prepared horseradish are produced each year in the U.S. The plant will grow in a wide range of habitats, but the Tulelake area is so like the Columbia Basin that there is little doubt that it could thrive here. It is a short-lived perennial that matures in the autumn.There appears to be marketing opportunities for this root crop. See Horseradish Council http://www.horseradish.org

Jerusalem Artichoke (*Helianthus tuberosus*) is a sunflower that is grown for its root, which is eaten like a potato. There is only a small market as food. The species can be used for livestock feed as well. Because we have large areas in the Columbia Basin where sunflowers grow as native plants, this would likely do well. Few acres are thus used at this time.

Lentils (*Lens culinaris*) as a food crop, is established throughout the near east, North Africa, and India. We have been growing lentils in the Columbia Basin since 1937 and have exported 90% of our annual crop. Lentils lend themselves to the arid climate of much of our area. It is difficult to harvest them mechanically because of the plant's short height, but work is being done on selection for taller lentils. If the worldwide market should expand, this is one of the promising crops.

Lupine (*Lupinus albus, L. angustifolius, L. luteus, L. mutabilis, L. cosentenii, et, al,*) are legumes that are cultivated worldwide as either grains or forage crops. They range from northern Europe and Russia to Australia and the Andes. They can be grown as over-wintering or spring crops. For the Columbia Basin they would likely be spring sown crops.

This plant has a seed protein content that is quite high, and could be a potential crop for animal feed. It can also be used for human food. It is important to be aware that many lupine species produce alkaloids that are poisonous. Species must be carefully selected to choose alkaloid free seeds.

Lupines were introduced as a cover crop in the southern cotton belt in the 1930's. By 1970, the cost of commercial Nitrogen fertilizer from petroleum/natural gas was low enough that the more labor-intensive lupine green manure crop was out of fashion. Work has continued to produce improved cultivars and trials in the Columbia Basin are very promising. See OSU data for tests in Pendleton and Moro. This could be one of the more encouraging examples of alternate crops for the Columbia Basin. Also see section under native plants as alternatives.

Meadowfoam (*Limnanthes sp. L.. alba, L. floccose, et. al.*) is native to southwest Oregon in the Medford area and has been researched by OSU and USDA for its rare oil properties. Some commercial growing has been done and it has found a place in cosmetics, specialty lubricants, and polymers. The native species grows well in shallow soils with less than 20 inches annual rainfall, and temperatures comparable to many Columbia Basin habitats, so the likelihood is that it would thrive here. OSU can provide further information.

Mustard (*Brassica juncea*) can be grown in a short growing season. It can be grown for its leaves or seed. Mustard greens are used in salads, or as cooked fresh greens, or canned or frozen. Mustard seeds are crushed to produce edible oil. Livestock tend to reject the oilseed because of its strong flavor. Mustard seed and ground mustard are used in meats, sausages, and relishes. Mustard can be used as a rotational crop with cereal grains, to reduce diseases, and to increase the following year's grain crop.

Onions (*Allium cepa*) can be planted either in the fall for over-wintering and spring harvest, or can be spring planted and harvested in autumn. Well-known onions like Walla Walla Sweets come in the spring with a storage time of only about two months, whereas autumn-harvested yellow onions will keep for six to eight months. Onions are a valuable crop in the Columbia Basin, but most areas require irrigation. Onions are also grown as a seed crop on some acreages. The market and number of growers has stabilized and not much opportunity for expansion is seen.

Peas: Field (*Pisum sativum*) are the most widely grown cool-season pulse. They are marketed as fresh shelled peas, edible pods, or as dry peas. They are canned or frozen for widespread marketing. The plants themselves are used for silage production, and for green manure to restore depleted soils. The area between Pendleton and Milton-Freewater has produced large amounts for more than 50 years. Improved cultivars and farming practices continue to keep peas on our tables. It is unlikely that any additional acreage of this crop is needed at this time.

Peas: Black-eyed (*Vigna sinensis*) is a warm season crop that presently has some acreage in the Columbia Basin. Much of what is produced is sold in Farmer's Markets and used for Southern-style cooking. Certainly the market has room to be developed. The crop grows well with minimal irrigation throughout our area. The peas that are harvested green and prepared fresh are quite different from those harvested later as dried beans (or peas).

Peas: Grasspea (*Lathyrus sativus*) is a creeping vine of the pea family. It is introduced from India, the Middle East, and Southern Europe. We also have several native species of the genus *Lathyrus* that occur in the Columbia Basin. This plant is usually grown for grain, but can be used for fodder. It is very high in protein, but a neurotoxic amino acid has prevented it from developing into an important food crop. New cultivars contain reduced toxin levels, giving it a great potential for semi-arid areas in the Columbia Basin. It can serve as a green manure to improve soils, and as a ground-cover alternative to summerfallow.

Peas: Chickpea (*Cicer arietimun*) is a cool season annual plant. India is the major producer and consumer of chickpeas. Their preference is for the small seeded chickpea called DESI. Elsewhere in the world the large seed kind is more in favor. It is called either KABULI or GARBANZO. It is in the legume family and different varieties grow from the tropics, sub-tropics, to temperate regions. It is a food plant, eaten fresh as green vegetables, parched, fried, roasted, or as a condiment. The seeds can be ground into flour used in soup or baked as bread. Chickpeas can be used as animal food, as well. A glue can be made of its vegetative parts, leaves yield a blue dye, and as a sizing for silk, wool, and cotton cloth. Historically, chickpeas have been in use for a very long time. It came from the Middle East and has been distributed throughout the world.

Chickpeas are produced commercially in California, Washington, and Idaho. It is likely that they will grow well in a number of Columbia Basin localities. Some test plots have shown promise. The present market is for garbanzos in salad bars, etc., but there is an increasing domestic market for the DESI types in ethnic communities in our larger cities. Since there is potential for export of chickpeas to a very large foreign market, this is one of the possibilities for improved income in our area.


Photo: http://plants.usda.gov

Penstemon (*Penstemon* species) a native flowering plant that is very popular in landscaping. Some of our species (*P. richardsonii*) bloom from May to November. Others can handle the harshest of habitats and flourish. (*P. deustus*) Some are so showy that viewers stand in awe (*P. barrettiae* and *P. speciosa*). They are popular with agencies when doing revegetation projects. It is possible for a very small acreage to yield value in both seeds and starts. These are labor-intensive and take some commitment, but the returns are good.


Photo: www.ultimatewatermassage.com/images/Product/herbs/spearmint1.jpg

Peppermint (*Mentha piperita*) grows well in parts of the Columbia Basin. Oregon is the nation's leader in the production of mint. Mint oil is produced in tiny sacs on mint leaves. The whole plant is moved in late summer, dried in the field, and taken to a steam distillery where the oil is separated. The area around Madras, OR produces some of the finest mint oil available, though plant pathogens at times cause crop losses.

Spearmint (*Mentha spicata*) is also grown, with similar harvesting methods and uses. Mint flavorings are found widely in toothpaste and other products. It is unlikely that much additional acreage of mint will be required unless unforeseen uses arise.

Pepper, Chili (*Capsicum annuum*) a warm season crop that needs a long frost-free period to mature. Since they are often started in greenhouses and transplanted, and also harvested by hand, they are very labor intensive.
Tabasco peppers (*C. frutescens*) and habanero peppers (*C. chinense*) are similarly grown.
These are high-value crops, but you will be likely to earn every penny.

Pumpkin (*Cucurbita pepo, C. moschata, C. mixta, C. maxima*) occur as one of these four species of squash related plants. Pumpkins require a long warm growing season, and irrigation is required. There is some demand for processed pumpkin for pies, and increasingly for a field of pumpkins to be visited by adults and their children, just before Halloween. Though labor intensive, this is a higher value crop that one might consider.

Rapeseed (*Brassica napus*) See Canola.

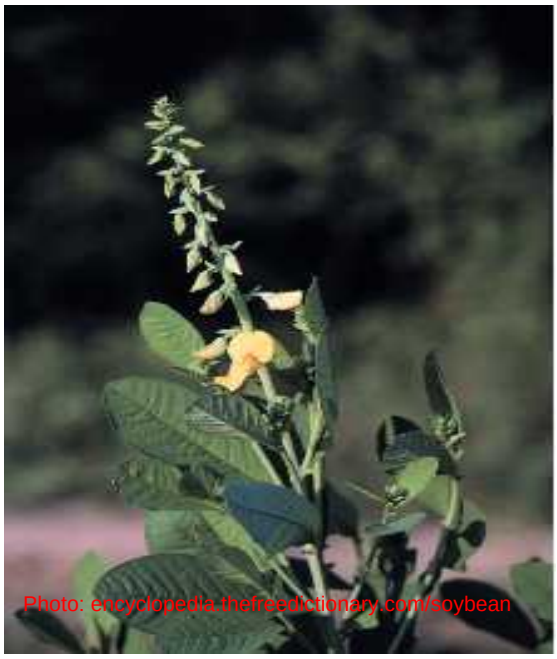
Safflower (*Carthamus tinctorius*) is a member of the Aster or Sunflower family. It is native to Asia, Africa, and the Middle East. Historically it was used for fiber, making dyes, and for food. We grow it in parts of the United States principally for its oil.It is an annual broad-leaved plant which grows well in both dryland and irrigated areas. Commercial production in California, North Dakota, and Montana are the principal areas, though Saskatchewan and Alberta produce significant amounts. Safflower oil as a cooking oil, salad oil, margarine, or shortening has found favor. A ready market exists, though linkage with a processing plant is a necessity. Safflower oil, like Canola, Soybean, Corn, and Sunflower oil, can yield a quality grade of bio-diesel for operation of motor vehicles. It is also used for producing synthetic lubricants, varnishes, and plastics.Some varieties of safflower are quite resistant to disease, though some succumb to bacterial blight. Current information gathering and testing results are advised. The meal that remains after oil extraction has value as a high protein supplement for livestock.

Columbia Basin soils and climate are well suited to safflower production. It is a spring planted crop that is vulnerable to competition from weeds in its early stages, so good weeding practices must be employed.

Sunfower (*Helianthus annuus*) is nearly circumpolar, occurring in most of the temperate world. It is a very important source of edible oil. The oil has a wide range of uses including cooking oil, margarine, salad oils, lubrication, soapmaking, and also for bio-diesel production for motor vehicles. The oil is also used with linseed and other drying oils in paints and varnishes. Kernels are eaten raw or roasted by people throughout the world.

Livestock are fed press-cake as a high protein supplement. It is also a source for silage and fodder, and hulls provide filler in livestock feeds and for their bedding. It is used as a green manure crop. It is a constituent of both wild bird seed mixes and food for caged birds. This is the same sunflower that is the state flower of Kansas, growing widely as a native plant throughout the Great Plains and west through the inter-mountain region to the Cascade Mountains, though the native does less well for seed production. It is a drought tolerant plant but needs to get its extensively branched taproot down to reach moisture approximately as deep as the plant is tall. This is required for a good seed crop. Lack of suitable farming equipment and oilseed processing facilities have hampered the commercial potential of this plant in our area. Silage production has been more successful, and feeding trials have shown that it is an acceptable forage crop for cattle.

Salsify, or **Oyster Plant** (*Tragopogon porrofolius,* and *T. dubius*) member of the sunflower family, a hardy biennial growing more than 4 feet in height. It has long grass like leaves, either yellow or purple heads of flowers, and roots that are quite large and cylindrical. This plant has successfully naturalized as a weed throughout North America. Salisfy is grown primarily for its edible root, which tastes like oysters. It is usually peeled and cooked like carrots or parsnips, added to soups or stews, parboiled and baked in a casserole with herbs and butter, pureed, battered and fried, or eaten cooked and cold in a salad. It is a very versatile vegetable. There is not a large market, but it could be profitable for a small farmer, grown in limited quantity.



Soybean (*Glycine max*) is a warm season legume that is used in the manufacture of edible oils, bio-diesel, and industrial products such as paint, varnishes, resins, and plastics. Soybean meal is an important livestock feed. While soybeans are generally considered a more southern crop, some tests have been made in Idaho, with limited success. Soybeans could be considered as a rotation crop when irrigation is possible.

Sunn Hemp (*Crotalaria juncea*) produces a bast fiber that could be used in pulp and paper applications. The fiber is used in twine, rug yarn, cigarette and tissue papers, fishnets, sacking, canvas, and cordage. It is widely grown in the tropics as green manure, and dried stalks are fed to livestock. The seeds are purported to be poisonous, but are fed to horses in Russia, and to pigs in Zimbabwe. Cultivation experience from over much of the world seems to indicate that it could grow in they Columbia Basin.

Spurge (*Euphorbia lagascae* and several other sp) An herbaceous annual plant native to Spain, though we have several spurges native to the Pacific Northwest. The seeds are a potential source of epoxy acid that is used for adhesives, plasticizers, industrial coatings, varnishes, and paints. Tests have shown that *E. lagascae* can be successfully grown in our area. Further study should be done on other *Euphorbia* species.

Vernonia (*Vernonia galamensis*) or Ironweed, is a native of eastern Africa. It is an annual composite family plant, somewhat like our Sunflower. It is a heavy producer of oil from its seeds. It can be used for epoxies, adhesives, paints, and varnishes. It has properties that lend itself to polyvinyl chloride (PVC plastic) production, without the use of petroleum based products. In its native habitat much of the land is similar in rainfall and temperature to the Columbia Basin and should be investigated further. As with other oilseed crops, processing facilities are presently lacking.

Watermelon (*Citrullus lanatus*) a member of the cucumber family, watermelons thrive in warm weather. They do require irrigation. They are planted so that the crops come off for sale from July through October. They are harvested by hand and with care. It is important to have dependable labor, because they ripen daily and must be harvested seven days a week all summer.

Wormwood (*Artemisia dracunculus*) or Tarragon is an aromatic perennial herb native to Russia that has become naturalized along the Columbia River. It is widely cultivated for its leaves which are a source of an aromatic oil used as flavoring in pickles and in vinegar. The oil is also used in perfumes, soaps, and cosmetics. Since it grows, essentially as an area, cultivation should be successful here.

Yarrow (*Achillea milefolium*) is a plant native to the temperate zone worldwide. It has a long history of use as an odorant for skin care products, nasal inhalers, etc. For many people the phrase “herbal essence” comes immediately to mind when they smell Yarrow in the field for the first time, for they have known the plant’s aroma long before they encountered the plant.

Yarrow grows abundantly and well throughout the Columbia Basin. It can thrive on shallow to deep soils with rainfall from 10 to 90 inches. Cold winters do not cause a problem and fall plantings over winter as six-inch basal leaves that stand up to zero temperatures. It revels in summertime hot spells, and can be harvested in its vegetative state in early bloom oil extraction. If left in the field its seeds are ready for harvest by September/October.

If this native plant sounds too good to be true, the fact is that the market has been very restricted and needs further development.

Other characteristics of this plant are that it has value as an herbal medicine, having astringent properties, as well as antibiotic use.

It is also more frequently used in mixes with grasses for low-water landscaping. It is a major player in mixes called “Eco-lawn”.

Further research in both uses and marketing are called for.

SHRUBS AND TREES

BITTERBRUSH
CEDAR, INCENSE
CHERRY, BITTER
CHERRY, CHOKE
COTTONWOOD
CURRANT, GOLDEN
ELDERBERRY, BLUE
HAWTHORN, DOUGLAS
HORSEBRUSH
JUNIPER
LAVENDER
OAK, OREGON WHITE
OLIVE
RABBITBRUSH
SAGEBRUSH
SUMAC
WILLOW

Bitterbrush (*Purshia tridentata*) is a rose family shrub that is native to the inter-mountain west. As forage for deer, antelope, and mountain sheep it is very important to having healthy big game range. Wildfires and overgrazing have reduced populations of this plant and active revegetation has been an ongoing aim. Propagation is by seeds, with low success rates, but additional work may change this. Our Columbia Basin soils and climate are optimum for the success of this plant.

Cedar, Incense (*Calocedrus decurrens*) is a cypress family tree that is grown in many canyons and flats throughout the Columbia Basin. It is a native tree that has been propagated in the yards of ranchhouses for shade and a bit of green. It grows west of the Cascades as well, but trees started there do not do as well as eastside trees do. There is a small steady market and at this writing a six to twelve inch start retails for six dollars. Even a small plot can yield additional farm revenue.

Chokecherry (*Prunus virginianus*) is a native shrub or tree that grows in riparian areas and gullies throughout the Columbia Basin. It is useful for streamside shade to keep water temperatures lower. As watershed councils become more active in our area, demand is increasing for trees and shrubs of this type. Chokecherry starts are easy to grow to suitable size for replanting.

Cherry, Bitter (*Prunus emarginata*) is a tree or shrub related to chokecherry and lending itself to the same uses. Neither bear edible fruit for human consumption, but wildlife like them, and as a native to our area, it is easy to grow.

Cottonwood (*Populus sp.*) including aspen at higher elevations, are native trees that are indicators of water close to the surface. A spring that might hardly be noticed in the rolling hills of Eastern Oregon, is almost always marked by a cottonwood tree or two. Cottonwoods are used for riparian improvement. Stream shading and cooling, and retention of organic matter in times of high run-off make it a worthwhile addition to the riparian mix of vegetation. Historically cottonwoods (especially the introduced Lombardy poplar) have been used as windbreaks for farming. As you go up the Columbia River you can identify in the distance the various crops…grapes, peaches, apples, pears, and others…by the rows of Lombardy poplars that serve as a buffer against the gorge winds. Other species from the cottonwood genus, many of which are native to our area, have been utilized. Aspens grow at higher elevations, and are presently under great stress due to land use issues. Some hybrid poplars are grown, under irrigation, as a source of pulp for paper. Others are showing promise as living filters for contaminated sites. Cottonwoods are easy to propagate and there is a small steady market.

Currant, Golden (*Ribes aureum*) is a native member of the gooseberry family that grows in every county in Oregon. It is valuable as a food source for wildlife, and equally valuable as a streamside shrub for shade and cover. Many early settlers and a few of us still use golden currants as a delicious addition mention the beautiful yellow flowers each spring. A market exists for this as an ornamental shrub with current prices as of this writing, an 18 to 36 inch start at $11.25.

Dogwood, Creek or Red-Osier (*Cornus sericea,* or *C. stolonifera*) is a widespread native shrub or riparian areas. Oregon Dept. of Transportation has planted millions of these at highway interchanges, throughout the state. This is a continuing market, as well as for streamside revegetation.

Elderberry, Blue (*Sambucus cerulea*) is a native shrub that is a valuable wildlife food source as well as streamside shading. It grows throughout the Columbia Basin and is commonly used for revegetation. after land disturbance. A small steady market exists for this shrub.

Hawthorn, Douglas (*Crataegus douglassii*) is a native shrub or tree that is part of the mix of a healthy riparian system. Its berries serve wildlife needs, and thorny tangles as protective cover. Streamside restoration work includes this species, and a small steady market exists.

Horsebrush (*Tetradymia canescens*) is a native shrub that looks somewhat like rabbitbrush, except that it has a spring bloom time instead of late summer as does rabbitbrush. When planted together, a landscaped area is in bloom for months, and an otherwise drab landscape comes to life. You may be getting in on the leading edge of this one, as it is just now being recognized for its value.

Juniper (*Juniperus sp*) has been looked upon as a weedy tree that encroaches on grasslands in the Inter-mountain West. Other than firewood and fence posts it has seldom been exploited. Woodworking for furniture, etc. has had a small market over the years. Steam-distillation of its powerful oils is a possibility.

Lavender (*Lavandula angustifolia*) is a bushy perennial shrub with purplish flowers that are often used as a dry flower accents, retaining their aroma for a long time. Lavender has been used as a perfume from early English times. There is a small market for dried flower use. It is propagated by cuttings, and the plant likes dry soils and full sun. It grows wild in dry creek beds from Arizona north to the Columbia Basin.

Oak, Oregon White (*Quercus garryana*) is a recommended species for rehabilitation of disturbed areas on the east slope of the Cascades. It is prime habitat for deer, elk, wild turkeys, and gray squirrels. Like other species, oak starts from the Willamette Valley do poorly east of the mountains, so nursery stock needs to come from a local source. State Parks, Highways, etc. are users, but increasingly private landowners want to buy oaks for restoration of their own lands. At this writing, an 18 to 24 inch oak is priced at $11.95. Growing them from acorns is labor intensive, but with a good return.

Olive (*Olea europaea*) grows in Mediterranean type climates similar to Oregon. It is drought resistant and can tolerate temperatures to 15ºF. Olives are long lived and grown for pickles and high priced oil. Almost all of US olives are produced is in the California Central Valley. Olives can be grown on land too poor to support other crops but requires vernalization (chilling) to flower. Conservation Reserve Program (CRP) land can be put to better use by growing olives.

Rabbitbrush (*Ericameria sp.* Formerly *Chrysothamnus*) is considered a roadside weed in some places, but increasingly is used as a landscaping plant. The examples at the Columbia Gorge Discovery Center are striking. Note the comments under Horsebrush for companion planting. Rabbitbrush is a native shrub occurring from the Dakotas to the Cascade Mountains. Recognition as an ornamental for xeric landscapes has created a market.

Sagebrush (*Artemisia tridentata* and other species) is the synonym of the old west. The aroma of the prairies after a summer thunderstorm is etched into the memories of many people. This is a widespread native shrub that is seeing increasing acceptance as a landscape plant. It also has a small use as a room air freshener, for which it is very effective. Even though there have been times when sagebrush was considered a weedy species, it is now recognized as a valuable of the plant communities which bear its name.

Sumac (*Rhus glabra*) is a native shrub throughout the Columbia Basin. It is very showy in the fall when its leaves are fiery red. It is used as roadside plantings at highway interchanges, and also in backyard landscaping. A small steady market exists for starts ready for transplanting. Sumac may have allelochemicals that can be used in the formulation of natural herbicides.

Willow (*Salix sp.*) is the primary streamside rehabilitation plant. It provides quick growth, shade, cooling, and cover. A dozen native species occur in our area, and as watershed councils become more active the demand for starts increases.

SOME OPPORTUNITIES FOR XERISCAPE PLANT NURSERIES IN THE COLUMBIA BASIN.

As city water bills skyrocket, and frequent water shortages occur, there is more attention being paid to alternatives in landscaping of residences.

Dry landscaping (xeriscapes) have become increasingly popular in cities like Bend, Redmond, Sisters, Prineville, Madras, The Dalles, Arlington, and Pendleton.

The environmental price we pay to keep lawns, parks, and golfcourses green is very high. Water, drawing down aquifers, or reducing streamflow volume, is significant. Fertilizers, and pesticides used to maintain monocultures are expensive and cause risk to adjacent areas.

What can a Columbia Basin landowner do to further the use of xeriscapes as an alternative? He can make available at a moderate cost to purchasers, the seeds and plants desirable. This involves some cost, and risk in choices and merchandising, but at least a few Native Plant Nurseries are presently thriving.

Some recommendations are:

Shrubs - **Rabbitbrush** (*Chrysothamnus nauseosus)*, a gray-leaved plant that flowers bright yellow in August, September, October when not much other color shows.

Horsebrush (*Tetradymia canescens*), in appearance similar to rabbitbrush with bright yellow flowers but with a bloomtime in late May and June. These two can be used together to have continuous flowering from May to October.

Bitterbrush (*Purshia tridentate*), a shrub of the rose family that has clusters of small yellow flowers in April and May. Some people confuse it with sagebrush.

Sagebrush (*Artemisia tridentate*), our classic feature of the shrub-steppe lifezone. It blooms in October.

Blue Elderberry (*Sambucus cerulean*), blooming in May and producing berries in September this is a showy one.

Western Sumac (*Rhus glabra*), blooming in July and with vivid red leaves in autumn.

Grasses - **Idaho fescue** (*Festuca idahoensis*) occurs as a native bunchgrass on north slopes throughout the basin where cattle have not grazed it to extinction. Attractive bunchgrass in a garden setting.

Great Basin Giant Wildrye (*Elymus cinereus*), a very tall bunchgrass that does well in gullies and lowspots.

Bottlebrush Squirreltail (*Sitanion hystrix*), a showy native bunchgrass suitable for accents.

Bluebunch Wheatgrass and **Blue Wildrye** are also good to accent somewhat shaded areas.

Forbs - **Buchwheats** such as *Eriogonum strictum, E. compositum, E. elatum, E. douglasii, and E. thymoides* all thrive with little or no additional watering.

Penstemons such as *P. barrettiae, P. richardsonii, P. deustus, and P. speciousa do well in xeriscapes. P. ricardsonii, or Cutleaf Penstemon* will bloom from May to November in the right conditions.

Desert-Parsleys such as *lomatium dissectum, L. cous, L. minus, L. grayi, and L. nucicaule* are fine early spring native ornamentals.

Asters such as *Macheranthera canescens* bloom for long periods, sometimes from September to December.

Prickly Pear Cactus makes a good accent.

Suggested reading:

Gardening with Native Plants of the Pacific Northwest by Arthur R. Kruckeberg, University Washington Press.

Collecting, processing, and germinating Seeds of Wildland Plants by James and Cheryl Young, Timber Press

FIRE-RESISTANT PLANTS FOR OREGON HOME LANDSCAPES to reduce the risk from wildfire…OSU Extension Service publication by Stephen Fitzgerald and Amy Jo Waldo

GROUNDCOVERS

Carpet Bugleweed (*Ajuga reptans*)
Creeping Phlox (*Phlox subulata*)
Creeping Thyme (*Thymus praecox*)
Hen and Chicks (*Echeveria* species)
Iceplant (*Delosperma cooperi*)
Kinnikinnick (*Arctostaphylos uva-ursi*)
Mock Strawberry (*Duchesnea indica*)
Periwinkle (*Vinca minor*)
Snow-in-Summer (*Cerastium tomentosum*)
Squaw Carpet (*Ceanothus prostrates*)
Stonecrop (*Sedum* species)
Wild Strawberry (*Fragaria* species)

PERENNIALS
Basket-of-Gold (*Aurinia saxatilis*)
Blue Flax (*Linum perenne*)
Chives (*Allium schoenoprasum*)
Coral Bells (*Heuchera* species)
Coreopsis (*Coreopsis* species)
Cranesbill (*Geranium* species)
Daylillies (*Hemorocallis hybrids*)
Evening Primrose (*Oenothera* species)
Fireweed (*Epilobium angustifolium*)
Heartleaf Bergenia (*Bergenia cordifolia*)
Hosta Lillies (*Hosta* species)
Iris (*Iris* species)
Lamb's Ear (*Stachys byzantina*)
Lupine (*Lupinus* species)
Penstemon (*Penstemon* species)
Red-Hot Poker (*Kniphofia uvuria*)
Sea Thrift (*Armeria maritime*)
Sedges (*Carex* species)
Sun Rose (*Helianthemum nummularium*)
Yarrow (*Achillea millefolium*)

SHRUBS
Cotoneaster (*Cotonaster* species)
Oregon Boxwood (*Paxistima myrsini*tes)
Salal (*Gaultheria shallon*)
Rhododendron (*Rhododendron macrophyllum*)
Privet (*Ligustrum* species)
Oregon Grape (*Berberis aquifolium*)
Yucca (*Yucca* species)

Daphne (*Daphne* species)
Vine Maple (*Acer circinatum*)
Rocky Mountain Maple (*Acer glabrum*)
Red-osier Dogwood (*Cornus stolonifera*)
Serviceberry (*Amelanchier alnifolia*)
Burning bush (*Euonymus alatus*)
Oceanspray (*Holodiscus discolor*)
Mock-Orange (*Philadelphus lewisii*)
Sumac (*Rhus glabra*)
Red-flowering or Golden Currant (*Ribes* species)
Lilac (*Syringa* species)
Spirea (*Spiraea douglasii*)
Snowberry (*Symphoricarpos albus*)
Rose (*Rosa* species)

TREES
Western Larch (*Larix occidentalis*)
Ponderosa Pine (*Pinus ponderosa*)
Lodgepole Pine (*Pinus contorta*)
Bigleaf Maple (*Acer macrophyllum*)
Norway Maple (*Acer platanoides*)
Horsechestnut (*Aesculus hioppocastanum*)
Red Alder (*Alnus rubra*)
Redbud (*Cercis* species)
Flowering Dogwood (*Cornus florida*)
Dogwood (*Cornus nuttallii*)
Birch (*Betula* species)
Ash (*Fraxinus* species)
Honeylocust (*Gleditsia triacanthos*)
Chokecherry (*Prunus virginianus*)
Walnut (*Juglans* species)
Oregon White Oak (*Quercus garryana*)
Crabapple (*Malus* species)
Cottonwoods (*Polulus* species)
Willow (*Salix* species)
Mountain Ash (*Sorbus* species)

SOME INTRODUCED SPECIES CONSIDERED NOXIOUS WEEDS WHICH MAY SHOW POSSIBILITIES FOR OILSEED, ADHESIVES, OR OTHER PROPERTIES.

Amaranth or Pigweed (*Amaranthus sp*)
Queen Anne's Lace (*Daucus carota*)
Hemp Dogbane (*Apocynum cannabinum*)
Milkweeds (*Asclepias sp.*)

Yarrow (*Achillea millefolium*)
Wormwoods and Sages (*Artemisia sp*)
Thistles incl. Knapweeds (*Cirsium, Centaurea et al.*)
Rush Skeletonweed (*Chondrilla juncea*)
Chicory (*Cichorium intybus*)
Gumweed (*Grindelia squarrosa*)
Sunflower (*Helianthus annuus*)
Prickly lettuce (*Lactuca serriola*)
Tarweeds (*madia sp*)
Groundsels (*Senecio sp*)
Goldenrods (*Solidago sp*)
Sowthistles (*Sonchus sp*)
Common tansy (*Tanacetum vulgare*)
Salsify (*Tragapogon dubius*)
All Wild Mustards (*Brassica, Cardaria, Descurainia, Isatis, Lepidium, Raphanus, Sisymbrium, et al*)
Marijuana (*Cannabis sativa*)
Babysbreath (*Gypsophila paniculatus*)
Soapwort (*Saponaria officianalis*)
Lambsquarter (*Chenopodium berlandieri, and other Goosefoot sp*)
Kochia (*Kochia scoparia*)
St. Johnswort (*Hypericum perforatum*)
Morning-glory and Bindweed (*Convolvulus sp*)
Spurge family (*Euphorbia sp*)
Castorbean (*Ricinus communis*)
Milkvetches (*Astragalus sp*)
Wild Licorice (*Glycyrrhiza lepidota*)
Peavines (*Lathyrus sp*)
Lupines (*Lupinus sp*)
Sweetclover (*Melilotus sp*)
Sage (*Salvia sp*)
Buckwheat family (*Polygonum, Rumex, Eriogonum et al*)

NATIVE GRASSES, HERBS, AND SHRUBS FOR LAND RESTORATION AFTER FIRE, EROSION, OR MECHANICAL DEVASTATION.

We have experienced in recent years, very disastrous fire seasons. A typical season shows two hundred thousand acres burned in Eastern Oregon, and many more in the Cascades, Siskiyous, and the Coast Range. There are places now blackened that should be left just as they are no further disturbance, but allowing time and seasons to bring them back. There are many thousands of acres however, that should receive the attention of land managers (State, Federal, and Private) in revegetating with native species to hasten the recovery of vulnerable landscapes. Perhaps several tons of native grass seed altogether, should be applied to these vulnerable lands. These seeds do not presently exist, but they

could be grown profitable on Columbia Basin farmland. To accomplish this there needs to be conferencing among the involved agencies, location of suitable funding, and finding farmers willing to explore their ability to grow and harvest these crops.

Here are some of the native grasses which would be suitable:
Blue Wildrye (*Elymus glaucus*)
Basin Wildrye (*Leymus cinereus*)
Idaho Fescue (*Festuca idahoensis*)
Bluebunch Wheatgrass (*Pseudoregnia spidata*)
Squirreltail (*Elymus elymoides*)
Junegrass (*Koeleria macrantha*)
Columbia Brome (*Bromus vulgaris*)

and quite a number of others. In addition to the grasses for restoration work there are plants such as the buckwheats, the penstemons, the desert-parsleys, and asters that could be grown for seeding fire-burned areas.

Shrubs that could be grown on farmland for a seed source for revegetation might be:

Rabbitbrush (*Ericameria nauseosa*)
Horsebrush (*Tetradymia canescens*)
Bitterbrush (*Purshia tridentata*)
Sagebrush (*Artemisia tridentata of A. rigida*)
Blue Elderberry (*Sambucus cerulea*)
Western Sumac (*Rhus glabra*)