

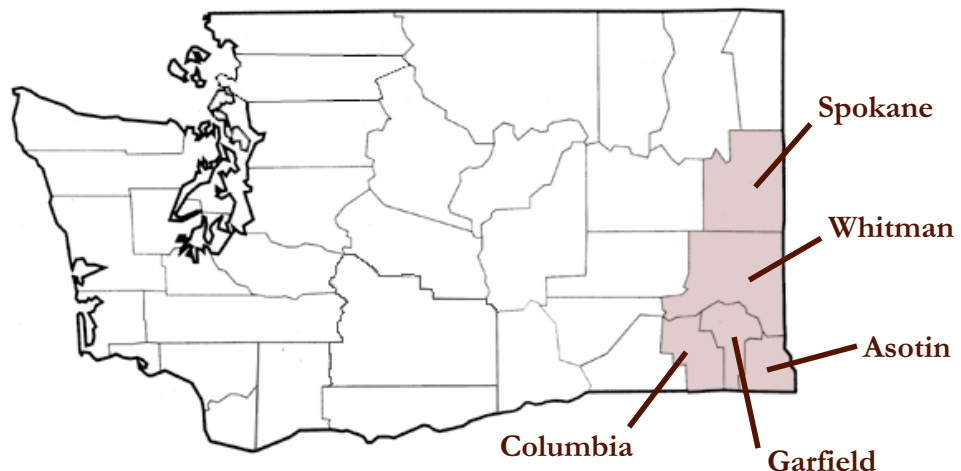
Crop Profile for **Lentils** in Washington

Production Facts

- ❖ Washington State ranks #1 in U.S. lentil production, with 43% of total national production.
- ❖ In 2000, 85,000 acres of lentils (including contracted "Brewer" type, Crimsons, Pardinas, French Greens, Estons, Red Chiefs, Lairds, Emeralds, and Richleas) were seeded.
- ❖ 10-year average yield is 1150 pounds per acre.
- ❖ The 1997 price of \$0.12 per pound provided a cash value of \$10.97 million. Reports for crop years 1998 and 1999 show lentil prices dropping to the \$0.07 per pound range.
- ❖ Production cash costs average \$83 per acre, with fixed costs at \$128 per acre. With returns of \$120 in 1999, this results in a net loss.
- ❖ Costs and returns are beginning to increase due to new technologies and the trend toward contracts for specialty lentils.
- ❖ The price of lentils in Washington is dependent on the Canadian crop and price structure.

Production Regions

Lentils are grown primarily within a 90-mile radius of Pullman in an area called the Palouse. Counties producing lentils in Washington include Whitman, Spokane, Garfield, Columbia, and Asotin.



Cultural Practices

Lentils (*Lens esculenta* L.) are produced on loam soils of 0 to 25 percent slope. The annual precipitation of the Palouse is 18 to 23 inches and the elevation is from 2000 to 3000 feet. Since the soils are about 60 inches deep, water capacity is abundant. Many Palouse region growers use lentils in a rotation with cereal and other crops for agronomic advantages. The following winter wheat crop makes up for the loss in profitability from the lentils. The value of planting lentils lies primarily in the growers' ability to break disease or weed cycles in cereal grain rotations, improve soil fertility and thus subsequent yields by fixing nitrogen, conserve soil moisture for later rotations, and limit soil erosion by offering an option other than summer fallow.

All Washington lentils are grown under contract, with the contractor providing certified seed to the grower. Growers do not save seed from previous lentil crops for planting.

Seedbed preparation is important. A fine seedbed is required for herbicide incorporation prior to seeding. Seeding date ranges from April 15 to May 15, after soil temperature exceeds 50°F (to avoid seedling diseases). A frost-free period of at least 110 days is required for crop maturity.

Seeding rates for lentils using traditional dick opener drills are 60 to 80 lbs. per acre for large Brewer types, and 40 lbs. per acre for small-seed Spanish brown and red lentil types. Seed must be inoculated with *Rhizobium* bacteria for nitrogen fixation if lentils or peas have not been produced for several years on a field. Packing of lentil seed for good soil/seed contact is essential. Plant density is from 15 to 20 per square foot.

Lentils bloom approximately 60 days after crop emergence. Bloom is defined as one open flower/raceme. Lentils are self-pollinating. No



Lentil plants in the field.

desiccation is necessary, as the crop naturally dries in the field.

All varieties of lentils are harvested in August. Lentils are cut and swathed into windrows approximately one week in advance of combining, using a pea bar attachment. Other growers in higher rainfall climates simply cut the standing crop. No chemical desiccation is required.

Hay from lentil vines is not used as an animal feed, so there are no industry concerns or restrictions on grazing or feeding lentil vines or hay. The vines are typically spread out back in the field.

Harvested lentils are shipped back to the contractor from the farm and then shipped to market or further processed per specifications of the buyer. Processing can entail hulling and splitting of the lentil before shipping. As a food, lentils can be stored indefinitely in a cool, dry place without losing nutritional value, taste, or freshness.

Lentils are grown for domestic consumption and export markets in Asia, the Middle East, Latin America, Europe, and Africa. Recent niche markets for small Spanish brown lentils (Pardina variety, grown for sale to Spain) and red lentils (Crimson variety, grown for sale to the Asian market) have provided greater profitability than the traditional large yellow cotyledon (Brewer variety) market. Since the United States can compete with Canada in Pardina and Crimson production, more

acres are being seeded under contract for these specialty lentils than for Brewer lentils.

Lentil production practices in Washington are based on time-tested Canadian practices. Insects are the most important pests of lentils followed by weeds then diseases.



*Varieties of yellow lentils.
From left: Laird, Eston, Brewer, French Green.*

Insects

PEA APHID

Acyrtosiphum pisum (Harris)

The pea aphid is one of two primary insect pests of lentils. Pea aphids damage lentils indirectly, by vectoring viruses, and directly, by feeding on the plants. Viruses vectored include pea enation mosaic; infected plants become stunted and are non-productive. Direct feeding on the plants becomes a problem in aphid outbreak years, when feeding reaches a level that depletes plant vigor or kills the plants. Pea aphid migrates to pea and lentil fields from the Columbia Basin in June, at about the time of bloom. One hundred percent of the lentil acres must be treated to control pea aphid. Cowpea aphid is not considered an important pest as it arrives in the fields after the seeds are formed.

Controls

Cultural

There are no alternative controls or cultural practices for control of pea aphid in lentils. Acreage is always scouted for presence of the pest before sprays are applied.

Chemical

Dimethoate (various trade names at 0.5 lbs. aia). (24c, WA-960031). 14-day PHI. Application is made to 100% of the crop, by air, at about the bloom stage. Dimethoate is usually applied for aphids and *Lygus* bugs at the same time. The lower label rate of 0.167 lb. aia for dimethoate is not

sufficient for long term aphid control. Using the higher label rate of 0.5 lbs. aia, losses to aphids are near zero percent. Other insecticides (esfenvalerate, malathion, disulfoton, carbaryl, methomyl, methyl parathion, and endosulfan) are registered for control of pea aphid and have been tried by growers. None of them provide cost-effective control comparable to dimethoate. Dimethoate is the most critical use of the lentil industry.



Pea aphids.

Ongoing Research

The U.S. Dry Pea and Lentil Commission and the Washington State Commission on Pesticide Registration have funded ongoing research to identify replacements for dimethoate, as dimethoate labels may be cancelled for pulse crops. The products under trial are identical to those for dry peas: bifenthrin (Capture 2E) at 0.04 lb. aia; lambda-cyhalothrin (Warrior) at 3.84 fl. oz. acre; cyfluthrin (Baythroid) at 0.03 lb. aia; a combination of cyfluthrin and imidacloprid (Provado) at 3.45 fl. oz. acre; and thiomethoxam as either a seed treatment (Helix) or as a floral spray (Actara 25 WP) at 14.67 grams per acre. All of these products provide excellent pea aphid control.

PLANT BUG

Lygus spp.

Lygus spp. is the other major insect pest of lentils. *Lygus* feeding produces “chalky spot” on lentils—depressed, chalk-colored lesions on the seed where the bug has fed. These bugs are an annual problem throughout the Palouse lentil production area. In years where pea aphid populations are very low, early sprays are not applied. Scouting for *Lygus* is critical to prevent damage to the crop. Close examination of the plants on hands and knees is the best way to see *Lygus* bugs, which are found under the curly leaves of the lentil plants in the daytime, and only rarely seen on the visible portions of the crop. Lentils are approximately six inches tall but lie close to the ground so sweeping with a net, an effective scouting practice in other *Lygus*-infested crops, will nearly always miss the presence of *Lygus*. Any presence of the bugs just before or during bloom justifies treatment according to the lentil industry.

Weeds

Lentils are very poor weed competitors, therefore weed control is critical for good production of lentils as well for the health of the subsequent cereal crops. Losses of up to 75 percent can occur if weeds are not controlled. Important weeds in lentil fields include cow cockle (*Vaccaria pyramidata* Medic.), shepherds purse (*Capsella bursa-pastoris* (L.) Medic), henbit (*Lamium amplexicaule* L.), Mayweed chamomile (*Anthemis cotula* L.), lambsquarters (*Chenopodium berlandieri* Moq.), catchweed bedstraw (*Gallium aperiine* L.), and black mustard (*Brassica niger* L.). Of these, Mayweed, catchweed bedstraw, and black mustard are difficult-to-control pests of the rotational wheat and pea crops that follow lentils.

Controls

Cultural

No cultural controls are available for lentils. Acreage is always scouted for presence of the pest before sprays are applied.

Chemical

Treatment for *Lygus* bugs almost invariably takes place when treatment for pea aphid is made. This usually occurs at 50 percent bloom, and the rate of dimethoate used for aphid control (0.5 lb. aia) is adequate for *Lygus* control.

Ongoing Research

Since *Lygus* are readily controlled along with pea aphid, all trials are designed to measure control of both species with all of the experimental compounds. New data will be obtained for Helix, Actara, and Provado, as these neonicotinoid insecticides have not been tested for lentils per se in the past. Due to the pea aphid connection, it is likely that one or more products will receive a section 18 or 24c label upon the loss of dimethoate for both dry peas and lentils.

Controls

Cultural

All growers practice crop rotation, which may include chemical fallow, to decrease weed pressure. Seedbed preparation is essential to lentil production. Tillage practices to form a smooth, firm seedbed eliminate winter annual weeds. Black mustard and Mayweed are spring weeds able to out-compete lentils and grow much taller than lentils, so seedbed preparation alone is not sufficient.

Chemical

Triallate (Far Go at 1.0 to 1.25 lb. aia). Used for wild oat control by pre-plant incorporation of the herbicide, using two passes of a disk or harrow. All lentil crops are treated with Far Go in combination with Pursuit as below.

Imazethapyr (Pursuit at 0.047 lb. aia). Product is preplant incorporated, along with triallate, for control of common broadleaf weeds. Imazethapyr can cause crop damage in wet years. All lentil crops in the Palouse are currently treated with these two chemicals. Older herbicides have been replaced by the combination of Far Go and Pursuit, which provide better weed control in lentils with ability to clean up the field for the winter wheat rotation. At this point, the Pursuit/Far Go application has become the industry standard. If lost, its replacement would constitute a critical need.

Metribuzin (Sencor 75 DF at 0.188 - 0.375 lbs. aia pre-emergent use or 0.125 -0.248 lbs. aia

post-emergent use). (24c, WA-870008). 75-day PHI. A postemergence herbicide, metribuzin is primarily applied by air on about 10% of lentil acres. Application is not common however, unless weed control is not achieved by the pre-plant incorporated herbicides above. An example is where patches of Mayweed chamomile occur in wet areas of a field. Metribuzin can cause crop stress under wet weather conditions.

Other herbicides registered are the grass herbicides **pendimethalin (Prowl)**, **sethoydim (Poast)**, and **quizalofop P-ethyl (Assure II)**, which are on rare occasions applied as post-emergence grass controls, especially where wild oats escape triallate treatment.

Diseases

Viruses including **pea enation mosaic** affect lentils as mentioned in the insect section, and are frequently vectored from alternate host legumes by the pea aphid. Therefore, virus control in lentils is strongly linked to pea aphid control.

Fungal diseases exacerbated by cold soil temperatures affect lentils, but lentils are far less affected by fungus diseases than other grain legumes. The root rot/wilt complex is the most important disease problem for lentils. The group includes *Pythium*, *Rhizoctonia*, *Sclerotium*, and *Fusarium* species in a complex. *Ascochyta* blight is the most devastating disease of lentils worldwide, and is the number one limitation on production and yield in Canada.

Controls

Cultural

Good seedbed preparation, crop rotation, clean seed, and well-drained soils are the principal means of avoiding root diseases in lentils.

Chemical

Thiabendazole (LSP Flowable, Mertec LSP at 1.7 -3.0 fl. oz. cwt). A section 18 exemption (00-WA-06) for use on lentil seed to control *Ascochyta* blight expired June 1, 2000, and was sufficient to treat seed for 55,000 acres in Washington. This is the fifth year this request has been granted. This constitutes a critical need for control of *Ascochyta* blight in Washington if this exemption is not renewed or a label is not received. Thiabendazole is registered in all lentil production countries except the United States.

Ongoing Research

Resistance breeding is also underway.

Critical Needs for the Industry

Replacements for dithiocarbamate and organophosphate insecticides are the most critical needs of the Washington lentil industry. Insecticides to replace dimethoate for control of pea aphid and *Lygus* spp. are a critical need as dimethoate may be cancelled. Also, thiabendazole for use as a seed treatment for *Ascochyta* blight is an exemption needing annual renewal, or preferably registration.

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

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