ALL ABOUT AGRICULTURE IN WASHINGTON

There's no such thing as a typical Washington farm. Some are small and cover just a few acres; others sprawl over thousands of acres (an acre is 43,560 square feet; a football field is 51,300 square feet).

Some farms are strictly family operations; others employ hired help. Almost all hire extra help at harvest time. Some grow and market plants; others grow plants as feed for livestock and market milk or beef. Very few are general farms. Almost all specialize in particular crops or animals.

This diversity is due to the many different crops and animals raised in the state. Wide differences in rainfall, sunlight, temperatures, and soils from area to area create wide differences in crops.

The best way to gain a feeling for Washington's agriculture is to visit several different farms around the state. We'll do just that, visiting seven farms that are fairly typical of different operations. Five of them—apples, beef, milk, potatoes, and wheat—grow the state's leading crops. Two grow unusual crops—Christmas trees and cranberries.

APPLES

Two areas on the dry, eastern side of the Cascade Mountains—the areas around Yakima and Wenatchee—are ideal for apples. They have warm days, cool nights, a long growing season, bright sunlight almost every day, and plentiful irrigation water from the snow that falls in the mountains.

Abundant sunlight is vital. Apple trees convert energy from the sun into food that can be used as energy by people. They do this through the green chlorophyll in their leaves.

Warm springs make larger apples. Cool fall weather helps apples color and become sweet.

Half the Fresh Apples

Apples must have more moisture than this desert-like climate provides; it comes from irrigation water stored in the mountains—both naturally in the snowpack and artificially in irrigation dams.

Carpentar's son Keith helps with apple harvest.
So the areas around Yakima and Wenatchee have all the requirements for growing large, smooth, superior apples: dry, sunny sheltered valleys with nearby mountains that store moisture to be used in the orchards below. Apples will grow in other areas, but not as well. The result is that Washington leads the nation in apple production. It produces one-third of all apples grown in the United States and over half of all apples eaten fresh.

A typical apple orchard is Les Carpentar’s at Manson, near Lake Chelan. Carpentar has 33 acres of trees. This is small for a modern farm, but not small for an orchard, since much work is still done by hand.

Golden and Red Delicious
Carpentar grew up in the area and bought his original 12-acre orchard after World War II (which he spent building P-51 fighters and B-25 bombers). He planted and developed the rest of the orchard himself. Most of the trees are Golden Delicious. The rest are Red Delicious. The trees produce 23,000 to 24,000 boxes of fruit a year. That’s nearly a million pounds of fruit or almost 2 million individual apples.

Carpentar’s biggest job is pruning the trees. He saws out old, weak, or broken limbs to stimulate growth of new wood. Only healthy, vigorous limbs and trees produce the large, well-colored fruit demanded by the market. Carpentar starts pruning in December, when the trees go dormant, and tries to finish by the end of March.

The next job during the year is fertilizing with zinc, since apple trees develop a zinc-deficiency disease if they don’t get enough of this fertilizer. An early insecticide spray is also applied to the trees before the leaf and blossom buds unfold. Its purpose is to kill insects while they are still in the egg stage and before they can cause damage.

Rent-A-Bee
In late April or May, Carpentar starts to irrigate. Irrigation continues until after harvest in September. The orchard blooms in early May, too, and Carpentar rents 20 hives of bees and leaves them in the orchard a week. The bees pollinate the flowers. Blossoms that aren’t pollinated won’t produce fruit. Some apple varieties are self-unfruitful and won’t produce fruit unless they are cross-pollinized with another variety. So when an orchard is planted, a pollinating variety has to be included in every few rows. Carpentar has Golden Delicious trees scattered through his Red Delicious plantings to provide this cross pollination.

As soon as the fruit is set, Carpentar starts thinning sprays. Thinning keeps the fruit from clustering too closely together. Without thinning, the fruit is apt to be small and poorly shaped. Other sprays are put on in May. One is a leaf feed that gives the trees nitrogen, phosphorus, magnesium, and boron—all essential fertilizers. With trees, fertilizer cannot be plowed into the root zone as it would be with crops that are planted every year. Leaves can absorb nutrients, just as roots would, and leaf feeding gets the fertilizer in use quickly and at the time it’s most needed.

Carpentar also puts on a pesticide spray to keep worms out of the fruit and take care of other insects and diseases which injure or de-
Les Carpentar examines apple blossoms.

stroys the leaves. Once most pests have been brought under control, the orchard may not need additional pesticides during the year.

**Thinning by Hand**

In June, it’s time for another round of fruit thinning, this time by hand. Carpentar hires several workers to help. Each tree is hand thinned down to the load it can carry, with the best apples left and the others removed.

In July, the fruit gets larger and the branches begin to sag with the extra weight. Carpentar props them up with pieces of wood. Propping separates the branches and allows even exposure to the sun. July is also time for a weed spray. It kills weeds that compete with the trees for nutrients and water. It also eliminates weeds that might become hosts for insects and diseases.

In August, the work load lightens. Irrigation continues and mowing of the grass that covers the orchard floor continues, too. But there is time for Carpentar to put his inboard-outboard boat on the waters of Lake Chelan.

**Spraying by Helicopter**

As the fruit ripens in September, a stop-drop spray is put on. It keeps the stems from breaking off before the fruit is fully colored and sized. This spray is flown on by helicopter. The trees are now so weighted down with fruit that a ground sprayer cannot travel through the orchard. Finally, in late September, harvest starts. It takes about three weeks, with a crew of 12.

After harvest, the orchard is cleaned up, the props removed, and fertilizer fed to the trees. Carpentar also sets out bait for orchard mice and gophers that feed on bark and roots of trees during the winter. Now the trees are ready for pruning and the start of a new season.

**BEEF CATTLE**

Much of Washington’s beef production comes from range beef operations. The beef cattle are used to harvest edible plants from ground that is too rocky, too shallow, too steep, or too dry to be plowed and planted to crops. Each year’s crop of calves is raised on the range until they are eight months old; then the steer calves go to feedlots where they are fattened for another six months while the heifer calves go back out on the range and become part of the breeding herd.

**Four Stomachs**

Cows can live on grass and other feeds that are too coarse for humans to digest because they’re equipped with three extra stomachs. The first stomach is a large one. It’s called the rumen. Grass is held in this stomach until bacteria break down the plant cellulose into simple foods the cow can use. Digestion is completed in the three remaining stomachs. The final or fourth stomach is most like the human stomach.

Most range beef operations are in eastern Washington. One that’s typical in size is Max Kiner’s KII ranch near Almira. It’s grass-sagebrush land in the non-irrigated part of the Columbia Basin. It takes 4,000 acres of this land to support a herd of 135 cows and their calves.
Calving is the busiest time of the year. The calf crop arrives in February and March and the cows need attention day and night—particularly the heifers who are having their first calves. During calving, Max Kiner takes the night watch and his wife Eleanor takes over at 4 in the morning.

**Individual Brands**

In May, when the calves are about 2 1/2 months old, they're branded, dehorned, and vaccinated for several diseases. The male calves are also castrated. They'll grow up as steers rather than bulls. Besides being branded with the ranch brand to prevent rustling, each calf is also branded with its own number. The number indicates its sire and dam. This lets Kiner identify the bulls and cows that produce the fastest-growing, strongest offspring. He keeps the best bulls and cows and gets rid of the others.

After branding the calves and cows go out on the range. They stay until late September, when they're rounded up and brought to ranch headquarters. There, the calves are weaned from their mothers and separated into two groups, steers and heifers.

Steers stay at the ranch headquarters and go into fattening pens. In 180 days, they'll go from a weaning weight of about 600 pounds to a finished weight of about 1100 pounds. They eat 25 pounds of feed a day. The feed Kiner gives them is whatever he can buy most cheaply. It's usually barley, dry feed peas, beet pulp (a sugarbeet byproduct), and oats. They also get hay and some alfalfa pellets.

**Thirty Miles of Fence**

The cows and heifers stay on the range until the snow falls, usually late December. Then they're brought in and put on their winter feed, which is hay. The bred cows calve in February or March. By that time the heifers have been
Cows and calves coming into working pens.

separated into two groups—the best ones are kept for the breeding herd; the others are fattened for slaughter. The cows and replacement heifers will be bred in May. Kiner keeps his own bulls, but also uses artificial insemination. He uses two breeds, Hereford and Short-horn. Crossbred animals make better weight gains and are 10 to 15 percent larger than single-breeds.

Besides taking care of the cows and steers, Kiner grows hay on a 100-acre pasture that’s irrigated by two creeks that flow through the ranch. Kiner cuts hay in June and again in August and then uses the field as a pasture. Other chores that must be done around the ranch are feeding hay twice a day to the cow herd from December through mid-May and checking 30 miles of fences, a job that’s done on horseback. One main chore is now automated. That’s feeding the fattening cattle in the feedlot. It takes only four hours a week with automation.

Horses are still important in cattle ranching.

CHRISTMAS TREES

Washington produces two million Christmas trees a year. Some 60 to 70 percent go out of state, mostly to California, Texas, and other southern states. As with other crops, Christmas trees are grown in the most suitable area. In the case of Christmas trees, though, it’s often an area that’s not suitable for other crops. Christmas trees grow well in the gravelly, infertile soil that was pushed to the south end of the Puget Sound by glaciers. They grow faster, of course, in richer soil but they also need heavy shearing each year to keep them from getting too tall and too thin. In poor soil they grow slowly and therefore need less shearing or pruning to produce a well-shaped tree.

U-cut Christmas tree operations have become popular in recent years. They provide city dwellers with an outing as well as a Christmas tree and they provide growers with the profit.
from marketing their produce as well as raising it. A typical U-cut operation near Tacoma is owned by retired schoolteachers Duane and Kay Kaiser. They have 37 acres of plantation trees.

**Popular Douglas-fir**

The Douglas-fir is the most popular Christmas tree and the best money maker for the Kaisers because up to 90 per cent of the trees can be sold. With pine and some other species, the cull rate may be as high as 40 per cent, leaving only 60 per cent of the trees to bring in the money. But the Kaisers do have all types of trees—grand fir and noble fir, which are native to the Northwest along with the Douglas-fir; the concolor white fir which is native to California, but does well in the Northwest; the Scotch pine, named for its native land and the most popular tree after the Douglas-fir; and Norway and Colorado spruce.

The trees are planted from November through April while they are dormant—not actively growing. The Kaisers plant 3-year-old trees, which cost more but develop faster after planting. They are about a foot tall at this point. About 600 trees can be planted by one worker in a day. The trees are spaced about 5 feet apart.

**Six Years to Grow**

It takes 6 to 9 years to get a marketable tree. During these years, the trees must be fertilized, pruned, sheared, and the competing weeds must be controlled. The Kaisers apply fertilizer in March or April before growth starts and when lots of rainfall can carry the growth-stimulating nitrogen to the tree’s roots. Each tree gets a cupful applied by hand with a sweeping motion around the base of the tree. Rich, dark green trees reward this effort.

During the second to fourth growing season, pruning and shaping with clippers and sharp knives is started. All branches on the lower trunk are cut off to 9 to 12 inches above the ground. The bare trunk makes a good base to fit in the Christmas tree stand.
Shearing cuts back leaders and side branches that have become too long during the year. This keeps the trees from getting sparse and spindly and, often, lopsided. After about the fourth growing season shearing is an annual need and takes 20 to 80 hours per acre depending on tree size.

Traffic Jams
Marketing is an essential part of a U-cut or U-pick operation. This means product quality, advertising, and all the rest. Hot coffee, candy canes, and sharp saws await customers after they have parked their cars. Parking is the key to a good day, Mrs. Kaiser says. Unless it is well organized, traffic jams occur and tree sales slow. The Kaisers use two-way radios to help keep track of traffic and for inventory protection.

Prices are about the same whether a tree is purchased from a corner stand or cut from the stump at the plantation. Freshness, fun, and the family outing make up for the work of sawing down the tree. Picking out that "just right" tree usually calls for a family decision and the youngsters have a big vote.

Tree Thievery
Although Christmas trees are symbols of a season of peace and good will, there is another side to the picture. Some people pretend to think that Christmas trees are free for the taking just about anywhere. Christmas tree growers label them no better than plain thieves. Vapor lamps that turn darkness to near daylight, two-way radios, and hired patrol services have helped at the Kaiser ranch. Some growers even use helicopters for surveillance.

In spite of the hard work and management problems, the Kaisers feel they have chosen a good way of life. They are sure of it when they hear a child shout "TIMBER" and then see the smiling faces that bring the Christmas tree out of the field.

CRANBERRIES
Washington is one of just five states that produce cranberries. The others are Massachusetts, where cranberries became part of the Thanksgiving tradition, New Jersey, Wisconsin, and Oregon. Cranberries require acid soil (pH 4.5-5.5) of peat and sand. They also need a good supply of water for harvest, frost and heat protection, and irrigation. In Washington, they're produced near Long Beach and near Grayland, both areas where cranberries grew as a native plant and were used by the Indians for food.

Jim Chabot is a television repairman and a fifth-generation cranberry grower at Long

Half the 250 sprinklers in Chabot's cranberry bog.
“Egg beater” harvester loosens cranberries from vines.

Beach. His great-great grandfather planted the first commercial cranberry bog there, using vines shipped from New England. Today Chabot runs a 17-acre bog started by his father in 1947. Each year the bog yields about 250,000 pounds of berries, a typical yield per acre for Washington and about 50 per cent above the national average.

Old Lake Beds
To start a bog, you must find a good bed of peat. Peat soil, formed in old lake beds, is essential because it stays moist, providing a steady water supply for the plants and a good growth medium for the roots. Without good, deep peat, bogs must be watered daily during dry weather. Then you peel off the topsoil, level the bog so it will drain evenly, ditch it to carry away excess water, and put in a sprinkler system that will reach all parts of the bog. The sprinklers will be used to protect the berries from sunscald and from frost.

Next you spread a layer of sand on the surface, and press in cuttings from plants that have a good production history. The cuttings will root in a few weeks and in three to five years you’ll have a producing bog. With good care, the bog will last 40 to 50 years.

Right after harvest each year, Chabot gets his vines ready for the next year’s crop. He uses a power pruner to trim long runners and prunes the edge of each section by hand. Even with machinery, he can prune only 3 acres a day. Pruning keeps the vines low and open, so sunlight can reach and color the fruit.

Warming the Bog
The vines are not dormant yet, so frost is a danger. To protect against it, Chabot uses his sprinkler system. Water gives up heat when it freezes (144 BTU’s per pound). As long as water is constantly being applied and freezing, this latent heat keeps plant tissues from getting too cold. It’s the opposite effect from evaporation, which makes the evaporated surface cooler.

Later in the winter, the plants are dormant and hardier, so frost is less of a danger. By mid-
LAND USE IN WASHINGTON


Legend:
- Alpine
- Forest
- Cropland
February, however, the fruit buds begin to swell and become less hardy, so the sprinkler system is again needed for frost protection. The system is automatic, triggered by a thermostat in the bog.

**Pulling Weeds**

In the spring, Chabot sprays for diseases, insects, and grassy weeds, which must be kept down because they shade the berries and keep them from turning red. Some hand weeding has to be done, since any chemical that would kill woody plants will also kill the vines. Hand weeding is one of the most tedious jobs. It must be finished by the time the fruit sets. After that, walking on the vines will damage the fruit.

As the vines begin to grow and the weather becomes drier, Chabot irrigates through the sprinklers. He adds nitrogen to the water as a fertilizer. Some fertilizer is also put on dry.

**Cooling the Bog**

The vines bloom in June and Chabot rents 20 hives of bees to pollinize the blossoms. After the fruit sets, sprinkling for temperature control becomes important. This time the goal is to keep the fruit cool. Whenever the temperature goes above 80 to 85°F, the sprinklers come on to cool and moisten the fruit and keep it from scalding. Scald is the cranberry equivalent of human sun- or windburn.

The vines usually have to be sprayed for fireworms and fungus diseases. The foggy, rainy climate encourages many types of fungus. It isn’t possible to eliminate them, but Chabot tries to keep their level low. Otherwise they would reduce yields.

**Mostly Juice**

Harvest, in early October, takes about 11 days. The crew floods a small area with 6 to 12 inches of water while an “egg beater” harvester loosens the berries from the vines. The berries float and are corralled with wooden booms and pushed and pulled to one end of the bog. There a conveyor lifts them to a truck where the water drains out.

The berries go to a processing plant where they are cleaned and graded. They will be made into cranberry sauce, relish, and juice, since water-harvested berries are not used as fresh berries (drying them with heat would reduce their keeping quality). Western cranberries, because of their bright red color, most often go into juice.

**DAIRYING**

Every big city has a milkshed. It’s like a watershed except that instead of water all flowing to a central point, it’s milk all flowing to the same point. Seattle’s milkshed extends as far north as Mt. Vernon, where Hubert Johnson has his dairy farm. A milk tanker picks up the milk from his 50 Holsteins in the afternoon and it’s on Seattle tables the next day.

Johnson milks his cows twice daily, at 6 in the morning and 6 in the evening. There is no time off in dairying. The cows have to be milked

One of Johnson’s 50 producing Holstein cows.
Breeder takes frozen sperm from -319°F container.

each day of the year. "To be a dairyman," Johnson says, "you've got to love cows. Otherwise it's too confining." A vacation is a weekend off, with the boys taking over, but that doesn't happen very often.

With machines, Johnson can milk the entire herd in two hours. The milk flows directly into a 600-gallon stainless steel refrigerated tank, where it's held for pickup. Each of Johnson's cows produces an average of 16,000 pounds of milk a year. That's 1900 gallons, well above the state norm. (And Washington has the highest per cow production in the nation.)

Cows and Computers

Johnson's cows produce so well because he manages them by computer. Computer analysis of his records shows him which cows are producing most economically, the right amount of grain to feed each cow for best production, and which cows to keep and which to sell. He gets monthly reports on his herd from the computing center at Washington State University.

High-producing cows need grain as well as pasture. Grain is more concentrated than pasture and gives them more energy for production. Johnson's top producers get 30 to 35 pounds of grain a day; his average cows 14 pounds. The grain mix contains corn, barley, oats, and high-protein oilmeal. The cows also get free choice roughage. That's pasture, or in the winter silage and hay. A typical cow will eat about 50 pounds of silage and 30 pounds of hay a day.

Johnson buys the grain mix the cows eat, but grows much of the roughage they consume. He has 100 acres of pasture, which provides eight months of grazing a year. This long grazing period is one reason why western Washington is an excellent dairy area. Dairying tends to concentrate in areas with plentiful rainfall and a mild climate. Both favor the lush growth of grasses and clovers. These furnish a large part of the nutrients cows need.

Sauerkraut for Cows

Johnson also has 140 acres of cropland planted to sweet corn and peas for canning and freezing. He uses the byproducts from both for his dairy operation. He makes hay from the pea

Milk tanker holds 3300 gallons.
Randy Johnson takes after-school shift on tractor.

vines and silage—which is something like sauerkraut for cows—from the sweet corn refuse. Even with all this roughage he still has to buy alfalfa hay, which usually comes from over the mountains in the Columbia Basin.

To maintain steady milk production, calving is a year round operation. Cows begin to produce milk with the arrival of each calf. Each milking period lasts 10 months. By that time the cow has been bred again and will soon produce another calf. If everything goes right, each cow has a calf every 12 months. Johnson keeps the heifer calves as possible herd replacements and sells the bull calves, after weaning, to beef cattle feeders. The cows are bred artificially, using frozen semen from top dairy sires. These are bulls that have been proven genetically superior, particularly in siring high milk producers.

POTATOES

Washington used to produce almost no potatoes. Now it’s second in the nation, just behind Idaho (and first in production per acre). The difference is the development of irrigation in the Columbia Basin, using water from Grand Coulee Dam.

One of the new potato growers in the Basin area is Herschel Heilig, who farms with his son Jerry near Moses Lake. Like the other early farmers in the Basin, the Heiligs were modern pioneers, farming new land. They can remember the dust storms that swept the area before crops were established and struggling to start trees and shrubs where none had grown before. They’ve seen the Basin go from raw sagebrush to highly productive farmland.

Fries, Mashed, Fresh

The Heiligs grow two kinds of potatoes, early and late. The early potatoes are dug in early August and processed into frozen french fries and instant mashed potatoes at a nearby plant. The late potatoes come out of the ground in September and are sold as fresh potatoes, the kind for sale at the store.

Although they’re called Irish potatoes, white potatoes actually originated in South America. They were first cultivated by the Indians in the Andes about 4000 years ago. Many other common foods today are also of American Indian origin: corn, beans, tomatoes, peanuts, avocados, squash, sweet potatoes, chocolate, pumpkins.

Northern Crop

Potatoes do particularly well in the Columbia Basin because it has the long, sunny summer days needed for high yields. The more light a potato plant gets, the more potatoes it produces. That’s why potatoes do well in northern areas, where summer days are long.

The Heiligs grow about 300 acres of potatoes a year. They grow other crops, too, on their 700-acre farm because potatoes can’t be grown in the same ground each year or diseases will build up in the soil. So the potatoes are rotated with alfalfa, field corn, sweet corn, and dry peas.
Planting potato seed pieces.
Harvesting early potatoes.

Fertilizer Bands

The early potatoes are planted in March, and the late potatoes in April. Fertilizer is banded along the row as the potato seed pieces are planted. The fertilizer mixture contains an entire year’s supply of nitrogen, phosphorus, potassium, sulfur, and zinc. Banding fertilizer is difficult, but takes less fertilizer than a broadcast application over the entire field. In banding, the fertilizer goes only where the plants can use it—below and to each side of the seed pieces. Then the fields are cultivated and harrowed to control weeds.

After all this is done, irrigation starts and continues until harvest. The Heiligs have both rill- and sprinkler-irrigated land. Rill or furrow irrigation is used on level land and the sprinklers are used on hills and slopes. With both types of irrigation, the crop is watered every sixth or seventh day.

During the summer, the Heiligs watch for insects and diseases and spray for them if needed. The Colorado potato beetle is particularly troublesome and usually requires a spray each year.

Avoiding Sunburn

Harvesting the potatoes is a delicate operation. It has to be done at the right speed and with a paddled digger to keep from bruising the potatoes. This is particularly important for the late potatoes, which are stored for sale as whole potatoes. The potatoes also must be protected from sunburn, which turns them green. As soon as the trucks are filled, a tarp goes over the top to shield the potatoes during their ride to the processing plant.

While the early potatoes are being harvested, the late potatoes are still developing and must be irrigated, so lots of labor is needed. Early harvest takes an extra crew of five in addition to the three regular hired men. Late harvest takes only one extra worker.

The early potatoes yield 23 or 24 tons an acre and the late potatoes 27 to 28 tons. The result is 7500 tons of potatoes from the Heilig farm.

WHEAT

Wheat is Washington's leading crop. It’s grown in many places around the state, especially in eastern Washington. It grows on dryland or under irrigation, but one of the places it does best is the Palouse area, along the Idaho border. The soil there is deep, which is important since wheat roots go down 6 to 8 feet.

In many respects, the climate in the Palouse—relatively mild, wet winters and warm, dry summers—is like that in the Near East, where wheat was originally developed from its wild ancestor plants. Wheat and another grain from the Near East, barley, are the world’s oldest...
crops. They’ve been grown for about 9,000 years.

**Triple National Yields**

Wheat yields are high in the Palouse, particularly in the higher rainfall zones. Near Pullman, where Gerry Hagedorn farms, rainfall is around 20 inches a year. As a result, Hagedorn, a farmer and a former practicing architect, gets excellent yields—about 80 bushels an acre and nearly three times the national average.

Good management and good plant varieties are also important. The variety Hagedorn grows is Nugaines, a soft white wheat tailored for Palouse conditions. Nugaines is a winter wheat that’s planted in the fall. Winter wheats yield more than spring-planted wheats since the plants go into the winter about 4 inches high and ready to grow rapidly once spring comes. The earlier planting gives them a head start.

Winter wheats can only be grown in certain areas. Winters must be mild, but distinct. If the weather is too cold, the plants winter-kill; if it is too mild, they grow but produce no grain. Thus the mild but definite winters are another reason why the Palouse is such an excellent wheat area.

**Free Fertilizer**

Hagedorn has 700 acres of land, but grows wheat on only 300. The rest is in seed peas, barley, bromegrass seed, and hay and pasture for his beef cattle. These other crops, particularly the peas, are an important part of wheat production. Peas, in common with other legumes such as alfalfa and beans, are nitrogen fixers. Nodules of bacteria on the roots take nitrogen from the air and fix it in the soil where it can be used by plants.

Hagedorn puts this nitrogen to use by planting peas first and then following them with wheat. After the peas are harvested, he tills the ground with a heavy disk or cultivator. He follows this with an application of nitrogen and sulfur fertilizer. Then he waits for weeds to grow. When they do, he goes over the field with

**Combine cuts wheat.**
A rod weeder. Rod weeding controls weeds that are difficult to suppress once wheat is planted. Uncontrolled weeds would rob the wheat of moisture and nutrients, lowering yields.

Generally these operations leave an ideal seedbed for wheat—smooth enough to hold moisture for the seedlings, but cloddy enough so rain won’t erode the soil away and wash out the seed. Planting is done in early October and just after a good rain. The seed is drilled just under the seedbed surface, along with fertilizer. In two or three weeks the wheat comes up. The small plants go through the winter, often under snow which protects them from extreme cold.

Soil Tests

When spring comes Hagedorn takes soil samples to see how much moisture the ground has stored during the winter. The lab report will dictate the amount of fertilizer required. The more moisture available, the more fertilizer the plants can use. Hagedorn puts on the needed amount in May, when the wheat is about 8 inches tall. A weed spray goes on at the same time. Spraying for diseases isn’t required, because Nugaines, the wheat Hagedorn grows, was bred to resist the common wheat diseases.

After all of this is done, the wheat is on its own. Closely sown crops such as wheat are not cultivated. Early in August, the wheat ripens and turns golden. Hagedorn moves his combine out in the field and begins to cut the wheat with a crew of three hired men. It takes them about 10 days to cut 300 acres if they’re not interrupted by rain.

To the Orient

The wheat Hagedorn produces is soft wheat. It’s not used for bread, but for crackers, cake, pie, cookies, and similar pastry items. Much of Washington’s soft wheat is shipped to the Orient, where it’s used for noodles.

Flour is made from the starchy part of the wheat seed, the part that would nourish the young seedlings if the seed were planted. The gluten in the protein cells of wheat seeds varies.
In soft wheat, the gluten is quite weak. If you made bread from soft wheat it would be very flat, because the walls of the tiny air bubbles would collapse. Hard wheat has stronger gluten and makes better bread, but makes poor crackers and pastries. Hard wheat is grown in the lower rainfall areas of Washington—those with less than 12 to 14 inches of rainfall a year. Production of soft wheat, such as Hagedorn grows, is confined to the higher rainfall areas.

A modern combine costs at least $50,000.
WASHINGTON FARM PRODUCTS
IN BRIEF

Washington has a long list of crops and livestock products that are worth over $1 million a year.

**Apples**—Washington leads the nation in production. Apples are one of the state’s top 10 crops. See page 2.

**Asparagus**—Washington is second in production (after California). It produces one-fourth of the nation’s crop. Production is in Yakima, Walla Walla, Columbia, Franklin, and Benton Counties.

**Barley**—One of the top 10 crops in the state. Production is in many areas, particularly Whitman, Spokane, and Lincoln Counties.

**Beans, dry**—Production is 40 million pounds a year.

**Beans, green**—Whatcom and Walla Walla Counties lead production.

**Blueberries**—Whatcom and Pierce Counties are leaders.

**Cabbage**—Clark County is the leading area.

**Carrots**—Washington is second in the nation (after California). Skagit, Whatcom, and Grant Counties are the leading areas.

**Cattle**—One of the state’s top 10 farm products. See page 4.

**Cherries**—Washington leads the nation. The state produces over a quarter of all cherries in the United States. Yakima and Benton Counties lead production.

**Chickens and broilers**—Pierce County is the leading area.

**Corn, grain**—Grant, Franklin, and Yakima Counties are leading producers.

**Corn, silage**—Production is over 1 million tons a year.

**Corn, sweet**—Yakima County is the leader.

**Cranberries**—See page 8.

**Cucumbers**—Skagit County is the leader.

**Eggs**—One of the state’s top 10 farm products. Thurston, Snohomish, Pierce, and Whatcom Counties lead production.

**Grapes**—The state produces 110,000 tons a year.

**Hay**—One of the state’s top 10 crops. Grant and Franklin Counties lead production.

**Hogs**—Whitman County is the leading producer.

**Honey**—The state’s bees produce 3 million pounds a year.

**Hops**—Washington is the nation’s top producer. With Oregon and Idaho it produces virtually the nation’s entire crop. Production is centered in Yakima and Benton Counties.

**Lentils**—Whatcom and Spokane Counties lead production.

**Lettuce**—Pierce County is the leading area.

**Milk**—One of the state’s top 10 farm products. See page 12.

**Mink**—Ranch mink production is 150,000 pelts a year.

**Mint**—Washington is the second leading producer (after Oregon). It produces one-third of the nation’s crop.

**Onions**—Walla Walla, Grant, and Adams Counties are leaders.

**Oats**—The state produces 2½ million bushels a year.

**Peas**—Washington is second in the nation (after California). It produces over one-fourth of the nation’s crop. The Chelan, Douglas, Okanogan County area leads production.

**Peaches**—The Yakima-Benton County area leads production.

**Pears**—Washington is second in the nation (after California). It produces over half of the nation’s dry edible pears.

**Potatoes**—One of the state’s top 10 crops. Grant County leads production. See page 14.

**Prunes, fresh**—The Yakima-Benton County area leads production. Washington is second in the nation (after California).

**Raspberries**—Whatcom and Pierce Counties are the leading areas.

**Seeds**—Washington is the nation’s third-leading producer of alfalfa seed. Other important seeds are bluegrass and red clover.

**Sheep**—The state’s farms have 140,000 sheep and lambs.

**Strawberries**—Skagit County is the leading producer.

**Sugar beets**—One of the state’s top 10 crops. Grant County leads production.

**Turkeys**—The state’s farms produce 200,000 turkeys.

**Wheat**—Washington’s most valuable crop. Washington is among the top five wheat-producing states in the nation. The leading Washington county is Whitman. See page 16.


W.S.U. AND AGRICULTURE

Washington State University has a special responsibility to agriculture. As the state’s land-grant university it’s charged by law with teaching classes in agriculture, doing agricultural experiments, and doing extension work in agriculture throughout the state.

In classes on the campus at Pullman, young men and women study agriculture as a background for careers in farming, business, science, teaching, and government. Agricultural research is done at Pullman and at experiment stations around the state. WSU discoveries have included some of the things just discussed in this booklet. One is the use of freezing water (surprisingly) to keep cranberries from being injured by frost. This method is now used around the world to protect all kinds of crops, including apples and grapes. In each county, extension agents help farm managers keep up with agricultural advances, including many in this booklet. One example is using fertilizer to increase attractiveness of Christmas trees.

By Sherill Carlson and Earl Otis
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COVER PHOTOS, top row, orchardist Les Carpenter, cattleman Max Kiner, cranberry grower Jim Chabot; bottom row, potato grower Jerry Heilig, dairyman Hubert Johnson, Christmas tree grower Duane Kaiser, wheat rancher Gerry Hagedorn.

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