

United States Department of Agriculture,

BUREAU OF PLANT INDUSTRY,

Office of Farm Management,

WASHINGTON, D. C.

HINTS TO SETTLERS ON THE UMATILLA PROJECT, OREGON.

INTRODUCTION.

The following discussion of crops and methods of handling the soil is intended primarily for the new settler who has not yet acquired experience in farming under the conditions of the Umatilla Project. It is assumed that the reader has had experience in farming elsewhere, and all that is here attempted is to point out a few of the important essentials to be observed from a local standpoint.

In preparing these suggestions the results obtained in the development of other districts with similar soil and climatic conditions have been carefully considered. The development of other similar districts is not sufficiently advanced, however, to indicate definitely just what should and should not be undertaken on the Umatilla Project. Much yet remains to be ascertained by future experience as to the methods of irrigating and farming and as to the crops and varieties of fruits that will pay best in this district.

The new settler should not be in too great a hurry. He should learn what he can regarding the successes and mistakes of those who have preceded him before attempting to do anything. It is far better to get 5 acres cleared and properly seeded than to attempt large things and make a sand blow of 10, 20, or 30 acres.

DESCRIPTION OF THE REGION.

The Umatilla Project is situated in northern Oregon at the junction of the Umatilla and Columbia rivers. The approximate distance by rail from Portland, Oreg., and Spokane, Wash., is 190 and 240 miles, respectively. The ultimate development of the Project will reclaim about 20,000 acres of land. Water is now available for 11,000 acres. Due notice will be given as to the date when water will be available for the remainder of the Project. The farm unit has been

fixed at 10, 20, and 40 acres, according to the distance from transportation points. There is very little land within the limits of the Project that is subject to homestead entry.

The land to be irrigated is gently rolling. It all lies between 350 and 560 feet above sea level. The soils of the Project are largely formed from rather coarse material laid down in the bottom of a lake which once occupied portions of northern Oregon and southern Washington. Since the disappearance of the lake considerable fine material has been blown and washed in from the surrounding higher levels. The surface soil, therefore, is a mixture of sand and fine material. In some localities the fine material predominates, while in other portions of the Project coarse sand forms the greater percentage of the surface soil. The subsoil is not uniform. In some places the coarse dark sand extends down for 20 or 30 feet. In other localities the subsoil consists of alternate layers of sand and smooth gravel.

THE CLIMATE.

The Umatilla Project has an arid, temperate climate. The normal annual precipitation for the town of Umatilla is 8.59 inches. Practically all of this falls during the late fall, winter, and early spring. The temperature during the summer months is sometimes high, but owing to the dryness of the atmosphere the heat is seldom oppressive. The winters are mild, though the mercury occasionally goes below zero. The prevailing winds are from the west and southwest. From the 1st of March until the middle of June is considered the windy season. The velocity of the wind is often sufficient to cause considerable drifting of the soil when bare and unprotected. There is very little high wind from the 1st of July until the last of February.

The growing season is long, this being one of the earliest districts in the Pacific Northwest. A careful study of the reports of the United States Weather Bureau shows practically all of eastern Oregon and eastern Washington to be subject to killing frosts during the month of April. The tender varieties of fruit are often more severely injured at low altitudes along the Snake and Columbia rivers than in localities with intermediate altitudes. This is not primarily because the low altitudes are more subject to frosts, but because the fruit blooms earlier than in the higher altitudes and is in condition to be injured when the frosts occur.

The early season is a great advantage on the one hand, for it will enable the farmers of the district to obtain the highest prices for early vegetables, melons, and small fruits. On the other hand, the tender varieties of fruit, such as peaches, apricots, and cherries, are more apt to suffer from the annual April frosts than they would were the altitude higher. At least this has been the experience in other similar districts.

CLEARING AND SEEDING THE LAND.

Considerable damage has been done in this district during the last two years by attempting to clear and seed land during the windy season. When the surface soil is stirred by grubbing the sagebrush, plowing, and leveling, the soil drifts and blows very easily. The drifting sand may cut off all vegetation, such as rye, wheat, alfalfa, and clover. The sand blow caused in this way is not only a great injury to the owner of the land, but also to his neighbor on whose land the sand drifts. A still further damage is sustained by the filling of the irrigation ditches. When this occurs the water must be turned off until the ditches can be cleared. Thus the whole community may suffer repeatedly by the mistake of a single person. The new settler will do well, therefore, to exercise considerable judgment in clearing his land and bringing it into cultivation.

The safest time to seed new land is during the late summer or early autumn. The sagebrush may be removed any time during the year, provided the surface soil is not stirred. During June, July, and August the land may be leveled and the ditches and flumes prepared for irrigating. Because of the rapidity with which water sinks in the coarse sandy subsoil of this district, the water should be carried in flumes as much as possible and the irrigating ditches should be short. This will save a great deal of water and permit the irrigation to be done much more quickly.

Because of the rapidity with which this sandy land absorbs water there is great danger of overirrigation. Too much irrigation not only wastes water but is likely to result in serious damage through the swamping of lower lands and the deposition of alkali on the surface of the soil in all low spots. Much of this trouble with seepage and the rise of alkali may be prevented if farmers are careful to use only as much water as is absolutely necessary.

When the hottest weather is over, usually by the last of August, the land should be thoroughly irrigated. Immediately after irrigating, while the soil is still moist, from 50 to 60 pounds of rye and from 15 to 20 pounds of alfalfa seed per acre should be sown with a drill to insure proper covering of the seed. The drill should be provided with a grass-seeder attachment that runs the alfalfa seed and grain out together. The drill should be set to cover the seed about 2 inches deep. At this season of the year the weather, water, and soil are all warm and the rye and alfalfa will start quickly, provided the soil is kept moist. In starting alfalfa in the fall it must be sown early enough to make considerable growth before winter comes on so that it will not be killed by the fall and winter frosts. One or two light irrigations should be given during the fall after starting alfalfa

the last of August or early in September. Young alfalfa plants examined the 1st of April that had been started on the tract of Mr. F. A. Yates the previous fall had made a good growth and their roots were abundantly supplied with nodules. The rye should be clipped with a mower two or three times during the spring, after it has jointed or headed out; to keep it from smothering the young alfalfa. That which is cut may be left on the ground to serve as a mulch. The sickle bar of the mower should be set to run high in order to cut off as little of the alfalfa as possible.

Rye may be sown alone during October. If the soil has been thoroughly irrigated the crop should make a good growth before winter. With the land well occupied by rye, alfalfa may be sown in the spring just as soon as water is available for irrigation. It should be sown in the rye with a grain drill when the soil is moist. The rye should be clipped as suggested above.

If the land is cleared and seeded in the spring, during the windy season, it will be well to clear only long narrow strips running north and south. The sagebrush should be thrown into windrows on each side of the cleared strips to serve as temporary wind-breaks. After the land is occupied by some crop that will hold the soil and keep it from drifting, the wind-breaks may be removed and the land they occupy seeded.

The following statement will give the new settler a general idea of what it will cost to bring new land into cultivation. The items in the statement cover the entire cost of fencing, clearing, leveling, seeding, and thoroughly irrigating a 10-acre tract owned by Mr. H. T. Irvin. The plowing was begun August 13, 1908, and the last irrigation was given September 12, 1908.

Cost of fencing, clearing, and seeding 10 acres.

Clearing land of sagebrush.....	\$30.00
Plowing.....	22.50
Leveling.....	20.00
Making drops.....	13.00
800 feet of lumber for drops.....	14.40
2,000 laths for outlets through ditch banks.....	7.50
227 pounds of alfalfa seed.....	49.94
365 pounds of rye.....	7.50
Labor, irrigating, 71 days.....	177.50
100 posts.....	14.00
Fencing, 24-inch poultry wire and 3 barbed wires.....	52.00
Labor, building fence.....	20.00
Total.....	428.34
Average cost per acre.....	42.83

THE IMMEDIATE EXPENSES.

The immediate expenses of developing raw land under irrigation are considerable. Many people undertake too much and exhaust their resources before paying returns can be obtained from the land. The new settler should carefully consider the following items of expense and make his plans according to his resources.

Little or no land can be bought within the Project for less than \$70 per acre. The water right, which is payable in ten equal annual installments, is \$60 per acre. The maintenance water charge, the cost of operating the ditches, will probably be about \$1 per acre. For the year 1909 it is \$1.30 per acre. In addition to this there is the expense of fencing, clearing, leveling, seeding, and irrigating the first year. In most cases it will be necessary to provide the dwelling house, stable, team, cow, poultry, wagon, tools, etc. No returns must be expected from the land the first year and but little the second year. During this time the living expenses must be considered.

The capital of the majority of the people who are settling in the irrigated districts is limited and they naturally want to know from what the quickest and safest returns may be secured. The writer has asked this question of a great many who have had experience in the matter in other districts and the answer is almost invariably "alfalfa and dairying."

ALFALFA AND DAIRYING.

The soil of this Project is very deficient in humus (decaying vegetable matter) and nitrogen. Before orcharding and gardening can become highly successful this condition must be corrected. In no other way can this be done so successfully as by growing alfalfa and feeding it to good dairy cows. When a good stand of alfalfa is once established its roots will penetrate far into the subsoil. When the alfalfa is plowed up and the roots decay, humus that is rich in nitrogen will be thoroughly distributed in the soil to a much greater depth than can be secured by the application of barnyard manure. Being a leguminous plant, alfalfa is capable of using atmospheric nitrogen. By its growth the soil will be built up in nitrogen far cheaper than by the application of commercial fertilizers. When the hay is fed to dairy cows the farmer will be able to fertilize small areas of land at a time with the manure from the dairy, upon which he may grow almost any crop he may desire.

When a good stand of alfalfa is well cared for it is very successful in this district. It can usually be cut four times each year. The annual yield of hay should run from 5 to 9 tons per acre. When successfully seeded in the fall of the year, from 2 to 4 tons of hay per acre should be expected the following season. The land will be built

up much faster and the returns will be far greater if the hay is fed to good dairy cows instead of being sold, for 75 to 90 per cent of the fertilizing substance of the hay will be contained in the manure. The cows should be fed in stables and lots during the whole year, for the land is too valuable to be used for pasture. No cow should be kept that will not produce 600 gallons of milk yearly.

The virgin soil of this district is not very productive. Unless a farmer has plenty of manure with which to enrich the soil all of his land should be sown to alfalfa just as soon as it is ready for seeding. No attempt to grow other crops should be made until the land has successfully grown alfalfa or some other humus-producing crop for one or more years, or until stable manure can be obtained. When available, manure should be applied liberally and well incorporated in the soil. A light application on the surface of the ground is of little benefit except to keep the soil from drifting. Irrigation should be frequent enough to keep the soil moist so that the manure will decay.

THE COMMERCIAL ORCHARD.^a

To plant and care for an orchard until it comes into profitable bearing requires considerable time and money. For this reason the men with moderate means can not afford to experiment with new varieties of fruit, however profitable they may be represented to be. Opinions will differ widely as to what will be most profitable to plant on the Umatilla Project. The safest guide is to follow the results obtained in other similar districts. There are many orchards that are 6 years old, and a few that are 12 or 14 years old, in the vicinity of Kennewick, Wash. It seems to be a very general conclusion among the orchardists of this district, which has very similar conditions to those of the Umatilla Project, that winter apples and pears are the most profitable tree fruits for them to plant. While peaches, cherries, and apricots can be raised, they do not produce full crops regularly on account of the damage sustained by the annual April frosts. Although winter apples and pears are sometimes damaged, they are much hardier than peaches, apricots, and cherries and bear much more regularly.

Of the winter apples, the Winesap has proved specially adapted to the irrigated districts with low altitudes. It requires a long season in which to mature, comes into bearing early, is prolific, and ships and sells well. Other varieties that are suggested are Jonathan, Rome Beauty, and Esopus (synonym, *Esopus Spitzenburg*).

^a The following suggestions as to varieties are made from the best information available. The choice of varieties is an important matter and should be made with care. The testing of varieties of fruit will be given much attention by the experiment farm on the Project, and farmers should keep closely in touch with the work.

Of the pears, the Bartlett is the standard. Some are planting the Comice, Anjou, and Winter Nelis.

If peaches, apricots, and cherries are planted they should be set on the highest ground, where the air drainage will be best. The varieties that are usually recommended for the irrigated valleys are as follows: Peaches, Elberta, Salway, Early Crawford, Late Crawford, Foster, Hale, and Alexander; apricots, Hemskirke and Moorpark; cherries, (sweet varieties) Napoleon (synonym, *Royal Ann*), Bing, and Lambert, (sour varieties) Northwest, Olivet, and Richmond.

If the suggestions previously made in regard to improving the soil are followed, small fruits, grapes, asparagus, potatoes, tomatoes, onions, and many other crops can be grown.

SMALL FRUITS, GRAPES, AND OTHER CROPS.

SMALL FRUITS.

The following varieties of small fruits are suggested for the Umatilla Project:

Strawberries: Clark Seedling (synonym, *Hood River*).

Dewberries: Lucretia.

Gooseberries: Industry, Smith, and Downing.

Raspberries: Red Antwerp and Cuthbert.

When well cared for, strawberries should be very profitable in this district. They mature very early and the first crates frequently sell for \$8 to \$10 each, though of course the bulk of the crop sells at very much lower prices. The first blooms are often injured by the April frosts. Owing to the very high price commanded by the first ripe fruit some way should be devised for saving the first blossoms. This can probably be done best by using cotton cloth for covering cold frames. The frames may be made as follows: On either side of beds 10 or 12 feet wide set wide boards on their edges. The cloth, ordinary unbleached double-width sheeting, is nailed to the upper edge of one of the boards. The other edge of the cloth is nailed between 1 by 2 inch strips. This forms a roller upon which the cloth is rolled when the beds are opened. The cloth is just wide enough to permit the roller to hang on the outside of the second board when the cloth is unrolled and spread across the bed. The sections of cloth should overlap and the ends of the cold frames should be well closed up. If the cloth is oiled it will be more effective.

GRAPES.

The following varieties of grapes are recommended for this district:

American varieties: Concord, Worden, Moore, Pierce, Delaware, Elvira, Niagara, Gaertner, Muench, Brilliant, and Duchess.

European varieties: Chasselas Fontainebleau, Veltliner, Mission, Muscatel de Frontignan, Queen Victoria, Black Hamburg, Golden Champion, Flame Tokay, Muscat of Alexandria, Franken Riesling, Lahn Traube, and Muscat Hamburg.

The European varieties of grapes must be planted with the expectation of letting the vines down and covering them well every fall. Unless this is done they will not succeed, for the winters are usually severe enough to kill the vines to the ground.

ASPARAGUS.

The early season of the Umatilla Project will make asparagus culture very profitable to those who will handle the crop properly. A very successful asparagus grower in the vicinity of Kennewick, Wash., starts it on sandy soil as follows: Furrows are laid off in the early spring about 15 to 20 inches apart. After scattering partly decayed stable manure in the furrows water is turned on to thoroughly soak up the soil and manure. Nitrate of soda is then applied and the soil cultivated while it is yet moist. Seed that has been soaked in warm water for at least twenty-four hours is planted in drills laid out over the furrows in which the manure and nitrate of soda were applied. The seed is sown in the drills about $1\frac{1}{2}$ to 2 inches apart, and when the plants are started well they are thinned to 3 or 4 inches. After sowing the seed the land is irrigated frequently and the soil cultivated while damp. Cultivating while the soil is moist keeps it from drifting so easily.

When the plants are 1 year old they are transplanted in rows 4 or 5 feet apart. Ditches 8 inches deep are laid off, into which manure is scattered and soaked as when planting the seed. The yearling plants are set 18 inches apart in the rows. The crowns should be 6 to 8 inches below the surface of the ground. Irrigation is frequent and manure is liberally used. One year from the date of transplanting, cutting the shoots for market begins. By purchasing the yearling plants for transplanting one year may be saved.

POTATOES.

Potatoes, especially the early varieties, should do well on soil that has been enriched with manure and irrigated for one or more years. The early varieties may be marketed the last of June or the 1st of July. This leaves plenty of time to raise such crops as beets, turnips, ruta-bagas, and cauliflower. In this way two crops may be grown on the same land during the season.

TOMATOES.

When they do not suffer too heavily from blight, tomatoes are a profitable crop. Gardeners in the vicinity of Sunnyside, Wash., have adopted the practice of growing tomatoes in drills. The seed is sown in the open field from April 1 to 15, at the rate of 1 to 3 pounds per acre. The drill rows are usually about 4 feet apart. The per-

centage of plants that blight is about the same whether grown in hills or drills. By sowing plenty of seed in drills there are enough plants which escape the blight to make the crop. Some even claim that a much smaller percentage of the plants blight when grown close together in the rows.

ONIONS.

Onions must be well protected from the wind to prevent injury from the drifting of the soil. They may be sold either in the cured or in the green state.

(1) *The main crop.*—The main or summer crop is cured and sold in the dry state. The long dry season insures thorough curing of the bulbs. One of the secrets in successful onion culture on sandy soil is to keep the soil moist from the time the seed is sown until the plants are well established.

(2) *Early spring crop.*—The early spring crop is sold when the onions are in their immature or green state. This crop may be grown in two ways: (1) During August—not later than the 1st of September—the ground to be planted is thoroughly irrigated. Furrows are then laid off 3 to 4 inches deep, into which the seed is drilled quite thick. The seed is covered about 1 inch deep. As the onions grow the soil is worked into the furrow. Later the rows are ridged up. By planting the seed in furrows and ridging the rows up, long tender stems are produced. (2) By the second method the seed is sown quite thick during the spring, and the irrigation and cultivation given is not so thorough as with the main crop. In this way small bulbs are produced. The onions are not gathered in the fall, but allowed to remain in the field. During the late fall growth is resumed and green onions are ready for the early spring market. For the mature onions the Yellow Danvers is recommended, and the Prizetaker for the green crop.

MELONS.

Watermelons do fairly well on the virgin soil, but cantaloupes are not a success until the soil has been improved with green manure, stable manure, or by growing alfalfa. Of the many varieties of watermelons, the Monte Cristo seems to have given the best results in other similar districts. The Rocky Ford cantaloupe is also a favorite among the melon growers.

GREEN-MANURE AND COVER CROPS.

Green manuring is plowing under green crops. It is one of the oldest methods of increasing the amount of vegetable matter in the soil. Cover crops are usually grown during the interval between regular crops when the ground would otherwise be bare. When they

have served their purpose cover crops are often plowed under as green manure. Because of their ability to use the atmospheric nitrogen leguminous crops, such as hairy vetch, spring or common vetch, and field peas, should be used when possible. In order to improve the texture and productiveness of the soil and keep it from blowing, the farmers of the Umatilla Project should use every possible opportunity to grow green-manure and cover crops.

The following crops are recommended:

- (1) For fall seeding, hairy vetch, rye, and wheat.
- (2) For spring and summer seeding, common or spring vetch, peas, rye, and wheat.

The purpose and use of these crops are fully discussed in bulletins listed at the end of this circular, and for this reason their further consideration is unnecessary here.

WIND-BREAKS.

While objections are often made to the use of wind-breaks they are very advantageous wherever orchards, vineyards, small fruits, and truck crops are exposed to strong winds. Especially is this true where the soil is sandy. Since the prevailing winds of the Umatilla Project are from the west and southwest, the principal wind-breaks should extend north and south. In localities that are low and level, where the air drainage is poor, they should not be dense at the bottom. Where the land is rolling enough to permit the cold air to move down the slopes between the wind-breaks they should have comparatively dense bottoms formed by low-branching trees or the undergrowth of shrubby plants. It should be kept in mind in planting wind-breaks that where dense and effective they may interfere with proper air drainage and thus cause trouble from frosts. In a majority of cases it should be possible to so arrange the wind-breaks that they will cut down the force of the damaging winds and yet interfere very little with air drainage.

Some of the more important points to be considered in the selection of trees for wind-breaks are the following: Their effectiveness in checking the velocity of the wind, value as timber, longevity, habits of encroachment upon the area protected, difficulty of starting, etc. Few trees meet all of the requirements. When a single variety is planted, few trees are as effective as the poplars, especially the Lombardy poplar. They develop rapidly, branch from the ground up, and make a very efficient wind-break when planted close together. A very satisfactory wind-break can be made by planting the black locust and the Russian artemisia together in the same row. The locust trees should be set about 8 feet apart in the row. The timber of the locust makes valuable fence posts.

The artemisia is a shrubby plant that is started from 7-inch cuttings set 12 to 15 inches apart. It should attain a height of 4 or 5 feet the first year and 8 or 9 feet the second year. Low wind-breaks can be made by planting the artemisia alone. A good hedge of this plant is growing on the experiment farm of the State College at Pullman, Wash., from which cuttings may be obtained.

The European larch instead of the black locust may be used with the artemisia. It will not spread and encroach upon the protected area as much as the locust or the poplar. Some may desire to plant evergreens, in which case the Norway spruce, Austrian pine, and Douglas spruce are recommended in the order named.

BULLETINS OF VALUE TO FARMERS ON THE UMATILLA PROJECT.

FARMERS' BULLETINS, UNITED STATES DEPARTMENT OF AGRICULTURE.^a

No. 30. Grape Diseases on the Pacific Coast.	No. 198. Strawberries.
33. Peach Growing for Market.	213. Raspberries.
61. Asparagus Culture.	220. Tomatoes.
113. The Apple and How to Grow It.	231. Spraying for Cucumber and Melon Diseases.
138. Irrigation in Field and Garden.	241. Butter Making on the Farm.
154. The Home Fruit Garden: Preparation and Care.	255. The Home Vegetable Garden.
156. The Home Vineyard.	263. Practical Information for Beginners in Irrigation.
157. The Propagation of Plants.	278. Leguminous Crops for Green Manuring.
158. How to Build Small Irrigation Ditches.	282. Celery.
181. Pruning.	287. Poultry Management.

OREGON EXPERIMENT STATION BULLETINS.

No. 75. Insecticides and Fungicides.	No. 100. Incubation Experiments.
94. The Apple from Orchard to Market.	101. Orchard Survey of Jackson County.
96. The Poultry Industry in Oregon.	104. Pollination of the Apple.
99. Orchard Survey of Wasco County.	105. The Culture of Small Fruits.

WASHINGTON AGRICULTURAL EXPERIMENT STATION BULLETINS.

General Bulletins.

- No. 83. Some Important Plant Diseases in Washington.
87. Raspberries and Blackberries.

Popular Bulletins.

No. 3. Pruning Fruit Trees.	No. 12. Care of Milk on the Farm.
5. Spraying for the Codling Moth.	13. Spraying Calendar for 1909.
8. Orchard Cover Crops.	14. Planting the Apple Orchard.
11. Commercial Potato Culture.	16. The Sulphur-Lime Wash.

^aAll persons interested in farming should obtain Circular No. 2, Division of Publications, which contains a list of the publications of the United States Department of Agriculture for free distribution. This circular will be forwarded free of cost by the Secretary of Agriculture, Washington, D. C.

The Farmers' Bulletins may be secured without cost by writing to the Secretary of Agriculture, Washington, D. C.; the bulletins of the Oregon Experiment Station by writing to the director at Corvallis, Oreg.; and the bulletins of the Washington Agricultural Experiment Station by writing to the director at Pullman, Wash.

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