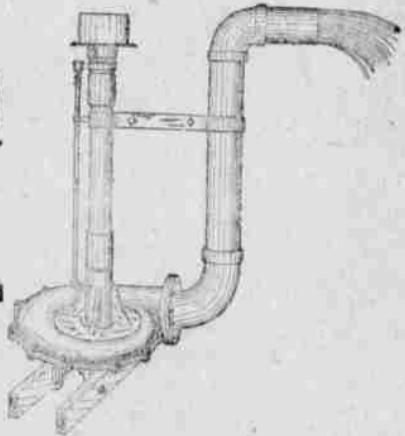


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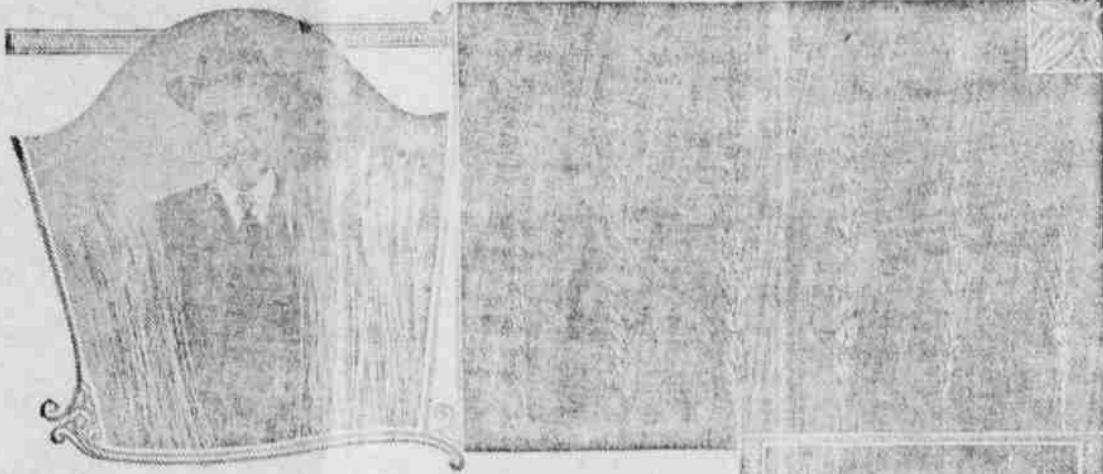
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## FARM ADVISER AIDS GROWERS



Hardy W. Campbell, Farm Adviser for the Southern Pacific Company, and grain showing the efficacy of the principles of tillage he advocates. Above, at right, the four heads in the center were grown according to Campbell's plan; the other two by the ordinary method.

### Principles of Tillage to Increase Yields Explained by S. P. Farm Adviser.

The same principles of tillage, in preparation of land for crops and subsequent cultivation, which have proven so successful in raising grain crops on Western semi-arid lands without irrigation are proving successful for crops raised under irrigation and for orchards and vineyards, according to Hardy W. Campbell, Farm Adviser for the Southern Pacific Company. Campbell has inspected this season a number of new orchards and vineyards in California, Oregon, Nevada, Arizona, and New Mexico.

Campbell is the man who evolved what is now called the "Campbell System of Dry Farming." Campbell, however, objects to the word "dry" and insists that the principles used in his present plan apply to all kinds of farming, with or without irrigation, as well as under a much lower rainfall than even now is commonly conceded necessary for successful crops. Campbell emphasizes the importance of proper preparation of the seed-bed and sufficient intelligent cultivation afterwards.

Campbell arranged to address the Nebraska Bankers' Association at Omaha, September 22 on the subject of "Soil Fertility by Tilth of Soil Water," and to discuss the same subject before the Minnesota Bankers' Association at Minneapolis. On his return from these conventions he will stop at Yuma, Arizona, to investigate conditions there.

Interesting evidence of the direct effect of properly prepared land was recently received by Campbell from a Metropolitan, Nevada, grainfield prepared under his direction. In the form of three stools of wheat, one stool had 81 stalks, one 102 and one 123, each the result of one grain of wheat drilled in well prepared soil that was liberally supplied with fertility through well planned and timely work. This crop was raised without irrigation, but was prepared for by summer tillage in 1921 and grown this year.

More evidence of what cultivation of a growing crop means was sent to Campbell by A. B. Shield of Delano, Kern County, California, in four heads of wheat from a stool grown on Shield's ranch. This stool had ample space and was cultivated while growing, no fertilizers or irrigation being used. The stool contained forty-four heads averaging 78 grains each or slightly over 3100 grains from one stool. Such results, says Campbell, simply mean that under certain physical conditions brought about by the right kind of tillage at the proper time, very much more grain, fruit or vegetables may be grown per acre than is commonly obtained. The usual query is "Does it pay?" to which Campbell replies very emphatically in the affirmative.

Campbell recently inspected a number of new orchards and vineyards in the northern and central portions of California to study methods and principles commonly practiced in preparing the land and the after care in irrigation and cultivation. One of these inspections was of a 4000 acre peach orchard of one, two and three-year-old trees belonging to the California Packing Corporation and located east of Merced, Calif. What

Campbell saw here in connection with his general observations shows that the real advantage of careful preparation of the soil before setting is sometimes, but not generally, fully considered and appreciated.

"It is very important to first prepare the surface by leveling," says Campbell. "Then arrange for irrigating in such a manner that water may not only be evenly applied over the whole surface but in as short a time as possible. In other words establish an even surface with reasonably short laterals. Too much water in the soil beneath some trees or too little for others is detrimental, usually. Again, the lower places, especially in heavy soils, rather more water, keeping the surface wet longer and frequently delaying timely cultivation, and not infrequently causing the higher spots to lose much of its already short supply. When the trees or vines reach the bearing period, the profit is increased or decreased in both quantity and quality of the crop. Both of these results are governed by the amount of fertility resulting from soil condition in which the per cent of moisture and air carried therein, especially during the warmer weather, is a big factor. The ability to supply this needed moisture in proper quantities the entire season through each year, is the first condition."

"The next question is the perfect root bed. This should be supplied liberally with available plant food evenly distributed, so that when the trees or vines are set, there is a condition so favorable that not only the weaker sets may quickly take root and grow vigorously, instead of withering and dying, but a healthy, uniform growth may be obtained the first year, which means much to the early and annual fruitage of the trees or vines."

"To achieve this result, after leveling the field should be cultivated practically an entire season before setting to trees or vines, with sufficient irrigation to assist in establishing the ideal root bed which should be both fine and fairly firm from the very start. The object is to continually carry the proper quantity of both air and water through the heated part of the season. Under this condition, with the high percentage of moisture held at the top of the firm soil, through careful and timely cultivation, there will be a liberal development and growth of that most desirable soil bacteria. This increases the moisture in all parts of the field, before setting, than can possibly be developed by any other method. This gives an advantage not otherwise obtainable."

"Much can be said of irrigation and cultivation after setting, but to be brief, care should be taken not to over-irrigate, for to obtain the best results, the soil in and about the root zone must be moist but not wet. When the soil is saturated there is practically no healthy growth. As rule cultivation is not only insufficiently frequent but too often is so untimely as to be of little value."

"There are certain conditions of moisture in the soil following irrigation, the same as following a rain, when the high value of cultivation to the final crop is very much greater. These conditions



must be considered. Nothing can prove this more convincingly than the soil auger.

"It is very desirable, so far as possible, to not only carry the high percentage of moisture at the top of the firm soil, immediately below the mulch, but also to induce free access of air throughout the entire growing season. The ideal condition to furnish this air is to cover the firm soil with a granular mulch, neither too fine nor too coarse. To obtain this ideal mulch, the cultivation must be done when the soil is moist—not wet or dry. The loosened soil soon dries, leaving the firm soil moist to the top. This is usually easy to obtain in sandy soils, but to do this properly in heavy soils it is sometimes necessary to go over the field a second time, after first going over just enough to loosen the top when the surface is still dry enough not to stick. This prevents the crusting or drying out. Then the second operation should come one to four days later, after the tree water has gone down, leaving the soil moist, when it more readily separates, and makes a finer and much more effective mulch. This procedure means much to the tree, as a higher percentage of moisture is held in the root zone and a crusting and cloddy mulch is prevented.

"The high value of this plan of preparation and one season's cultivation before the setting of the trees or vines, is borne out by the increasing results obtained from careful summer tilling for wheat, oats and barley, and the increase of time in doing the work is just as vital. There are numerous records of large yields of wheat as high as 60 to 80 bushels per acre, grown on correctly summer tilled land, where nearby fields, prepared and sowed under the more common plan of 'any old way,' yielded very poorly or nothing at all."

"The Southern Pacific Land Department 'Bulletin No. 10' deals quite explicitly with questions of increased fertility by tillage. Bulletin No. 12 also explains in detail the summer tilling question as applied to the coast country. One or both may be obtained without cost by letter or personal application to Hardy W. Campbell, 981 Southern Pacific Building, San Francisco. A Bulletin is now under way dealing with tillage and irrigation of orchards and vineyards."

Campbell's greatest pleasure is to visit a farm or ranch where the proprietor or manager feels he is not getting satisfactory returns, and work out, as far as possible, a practical remedy. The Southern Pacific follows the theory that its interests are tied up with the territory it covers, and Campbell and the Company wish to be helpful in increasing agricultural productivity.

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