

New Planter for Range Seeding

drill-type planter developed for seeding rolling hill grazing land without seed bed preparation

D. C. Sumner and R. A. Kepner

A new drill-type planter makes it possible to seed forage plants on rolling open hill grazing land without seed bed preparation.

With the exception of irrigated pasture land the areas of California generally devoted to grazing can be divided into three groups:

1. Bottom land or retired crop land, where seed beds for planting legumes and perennial grasses can be prepared properly for establishing dry land pastures.

2. Brush land, where mechanical clearing or the judicious use of controlled fire can be used to prepare much of the brush areas for seeding.

3. Rolling open hill land, where much time and money have been wasted trying to seed the land without some form of seed bed preparation. In nearly all cases the early and very rapid seedling development and growth of the poor quality resident annuals furnish such strong competition that the slower growing seedlings of the seeded species do not survive the first year or—in many cases—the first spring.

The competitive power of the resident annuals is illustrated by an examination made in the fall of 1949 when samples of surface soil were taken from a range area in Stanislaus County.

All seeds were removed from the samples. A count indicated that the samples represented 25 seeds per square inch of surface soil, or 700 pounds of seed per acre. The majority of the seeds were of rat's-tail fescue, fox-tail barley and other resident annuals. A planting of perennial grass seed at the rate of 10 pounds per acre would be equivalent to about one half seed per square inch of surface soil in competition with 25 seeds of resident annuals.

Under such conditions the establishment of perennial species on the range would require the removal or the control of this type of plant competition for at least the first year.

The use of a general contact herbicide applied after the seedlings of the resident annuals have emerged has proved successful in controlling this plant competition in those areas where spring plantings are satisfactory.

Early fall planting—in spite of the hazard of late rains and early damaging frosts—has given better results than

spring planting in most areas of open rolling hill range. A general contact spray could be used in these areas but there are two disadvantages: 1, in most range areas of the state it is difficult to get equipment onto the field until well along in the spring and spring-seeded perennial species develop so slowly—except in the north coast

counties and in high elevations—that they do not become well enough established to withstand the dry summer; 2, the necessity of furnishing large amounts of material for the spray solution in areas where suitable material must be transported some distance.

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Portion of an area seeded with the Range Seeder. The rows should be planted on the contour; otherwise denuded strips form channels encouraging erosion.



Experimental two-row Range Seeder. Machine was built light and compact to facilitate transportation. Note scraper blades arrows to the front and inside of the wheels, and the double disc furrow openers. Center hoppers are for fertilizer. Outer hoppers are for seed. Cradle is to support drum used with spray equipment.

Nitrogen Sprays

tests reported with fertilizer containing 44% organic nitrogen

E. L. Proebsting

The use of a spray to supply nitrogen to the aboveground parts of trees was re-examined in 1950 because of the results obtained by various investigators in other states.

Trials in 1944 with urea on peaches, apricots and Japanese plums did not prove successful. No response was obtained on any of these, even with very deficient peaches where up to six applications at the rate of five pounds of commercially prepared material—Nugreen—containing 44% organic nitrogen per 100 gallons of water were made. These trials all received their first spray in May, when abundant foliage was present. Results on apples tested at Cornell indicated that earlier timing was desirable.

In 1950 plots of sweet cherry, apricot, peach, almond, and apple were laid out, sprayed, and the results observed. Observations were made also on fig and walnut trees sprayed on the initiative of cooperating growers.

Each of the stone fruits and the apples dealt with last year were sprayed at about petal fall, and subsequently at different times for the different species.

The sweet cherries received a second spray on some trees; the other stone fruits up to three applications. All were made at the standard rate of five pounds per 100 gallons. There were no rains sufficient to carry any into the soil even for the earliest blooming sort, the almond. Leaf samples were taken at intervals, washed and analysed for total nitrogen.

The apples behaved in the same manner reported by several men in other sta-

tions. A marked deepening in the color of the leaves followed spraying. Since this was the first season of trial and the fruit buds were already formed, blossoming was not affected. The trees were thinned to about the same crop. There was no delay in maturity on either the Gravensteins or Golden Delicious used in these trials. Gravensteins were sprayed in three orchards and Golden Delicious in one. There was much less response in color in the latter variety, side by side with the first.

The stone fruits all failed to respond. No effect could be seen on any of them except that there was slight tip burn on the almond after the second spray. The necrotic tissue separated cleanly from the remaining healthy tissue after about a month. The remainder of these injured leaves stayed on the trees and could be identified by the truncated ends throughout the season.

Figs of the Kadota, Calimyrna and Adriatic varieties at Merced were sprayed and showed visible benefit in leaf color and in the rapidity of recovery from a spring freeze.

Walnuts at Linden sprayed with 10 pounds of a 44% organic nitrogen preparation per 100 gallons, soon after shedding of pollen, were severely injured. The young leaves and growing terminals were burned and every nut shed.

Olives in Tehama County in tests initiated by the farm advisor showed a marked response to the spray in amount and size of fruit on limbs both girdled and sprayed, compared with those only

girdled. Ungirdled limbs produced much less and smaller fruit whether sprayed or not, and there was no improvement in either character by spraying. There may have been a slightly adverse effect.

The peach, the apricot, the apple, and the almond—but not the sweet cherry—will absorb zinc from foliage sprays in sufficient amount to correct deficiency symptoms. The walnut does not absorb zinc readily. There is no correlation between the ability of a species to absorb zinc and its ability to absorb urea. The factors which control the absorption of materials sprayed on the foliage should be investigated.

The results obtained here with stone fruits check the reports of investigators working with peaches in New York, Maryland and Georgia in the eastern section of the United States. It would appear that application of urea as a spray has a place as a supplement to or as a replacement for the standard method of soil application for apples. It has been shown by workers at Cornell and elsewhere to be a more efficient method of use, pound for pound of actual nitrogen, and the response is much more rapid than application to soil. Since it can be included with other materials which will be sprayed in any case, cost of application is negligible. It should be possible to regulate the nitrogen status of the tree more accurately than is possible by soil applications alone.

The use of a 44% organic nitrogen preparation as a spray seems to have some possibilities for figs, olives and walnuts, although these trees should receive more attention before recommendations as to practice can be given. There seems to be little place for it in the orchards of stone fruits of the species tried to this time.

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Another method of controlling the plant competition would be the removal of the seeds or plants of the resident annuals from the surface soil by means of scraper blades at the time of seeding the perennial species.

The new range planter was developed by the Divisions of Agronomy and of Agricultural Engineering to scrape away the unwanted plants, drill the seed of the perennials into the ground, and apply fertilizer to stimulate early seedling growth.

The experimental planter was a two-

row machine with scraper blades mounted to clear one-foot wide strips ahead of the double-disc furrow openers of the drill. Fertilizer hoppers were mounted on the unit to feed into the furrows. Drag chains behind the openers covered the seed lightly.

The drill, which had a fluted-wheel type of feed, was adjusted to meter out 10 pounds of rice hulls per acre. This was done so different rates of seed per acre or different mixtures could be applied without requiring calibration for each grass and legume species or mixture.

Experimental seeding rates were low. A mixture made up of one half pound Harding grass, one half pound Subclover,

one half pound nodding stipa, one quarter pound Rose clover, and one quarter pound alfalfa mixed thoroughly with 10 pounds of rice hulls to seed an acre, gave—by count—an average of about 15 seeds per linear foot of row. This mixture would cost about \$1.90 per acre.

The efficiency of the planter in scraping the area clean and drilling the seed into the ground depends a great deal on the type of soil and the weight and strength of the machine. On the hardest and most compacted soils the disc furrow openers of the light experimental planter could do little more than form shallow grooves in which the seed and fertilizer

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SPIDER MITE

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bark or on the ground and moves out on the tender foliage in early summer, though it usually does not become serious until July.

It has been noted that the mite species predominant one season may not be the predominant species the following season in any one orchard. For example, *Bryobia* may have been the principal mite species present in 1949, while in 1950, European red mite may have assumed the dominant role.

The Brown almond mite and the European red mite may be controlled by destroying the overwintering eggs during the dormant period. Dormant oil emulsions have been recommended for this purpose. The past winter field tests of a new spray compound—DN-289 and Elgetol 318—when applied as a delayed dormant spray gave very satisfactory results in destroying the overwintering eggs. These materials are water soluble and should not be applied during rainy periods. If control is not obtained during the delayed dormant period a selection of an acaricide—listed as *Good* in the table—which will control both species should be made and the application made early in the season after full bloom.

Infestations of European red and two-spotted mite usually build up with the first warm weather in June. It is important to not permit a large population of mites to occur before the mite control spray is applied. Due to the long residual value of some of the newer acaricides control can be obtained for several weeks after a thorough application. A selection of a proper acaricide for these two mites should be made and the material applied with the first signs of increase in population on the foliage.

In some fruit areas populations of two-spotted mite and the Pacific mite become serious in July. Control may be obtained by the selection and proper application of a *Good* acaricide which is effective against these mites.

Spray Injury

In the selection of a spray chemical for the control of spider mites consideration must also be given to the possibility of spray injury to the fruit or foliage. High temperatures at the time or immediately following the application may cause injury with some chemicals. Varietal susceptibility to spray injury in some cases may be a factor.

Injury to apples and pears have been noted from:

Sulphur which may burn fruit and foliage of apples with high temperatures. In the coastal areas the trees have to be pre-conditioned by the use of lime sulphur

in the early season before sulphur may be applied to the foliage.

Oil sprays. Certain varieties of apples have shown oil spray injury about the calyx end by the use of too frequent oil sprays. Oil sprays applied to pear trees may cause defoliation if high temperature prevails after the application. Oil sprays may reduce the fruit size on Hardy and Winter Nelis pears when applied during the period of rapid growth. Oil sprays may cause fireblight to spread in Bartlett pear orchards where fireblight is present.

TEPP. There is a danger of burn to foliage and fruit from too concentrate sprays or over wetting of the foliage.

Parathion. There is a possibility of varietal susceptibility to certain varieties of apples in the coastal counties.

Aramite. Leaf burn on pears in the early season.

K-6451. Leaf burn on pears in the early season and occasional russetting.

DN-111. Will burn fruit of both pears and apples under high temperatures.

No injury has been noted on apples or pears up to the present time from the applications of Karathane, EPN, 923, R-242 or DMC.

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WALNUTS

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but large trees with heavy foliage may afford a certain amount of protection, and under such circumstances the chances for the organisms to survive are enhanced.

Infection on young twigs, not coming via leaf stem or fruit stem, is in the form of small, water-soaked rather irregular spots, sometimes a few millimeters in diameter. The affected areas usually enlarge more rapidly parallel to the long axis of the stem than to the width. Under conditions of high humidity yellowish brown exudate may occur on the surface of the lesion, heavily charged with bacteria.

The nut is susceptible from its first appearance to the end of the season. At or soon after the time of pollination the nuts predominantly are infected at the apical end through the stigma. The stigma turns black, and a black streak can be seen either from the outside or by a longitudinal cut. This results in a larger lesion on the nut around the base of the stigma so typical of blight. Apical infection of the nuts is the most serious phase of the blight since it leads to the shedding of enormous numbers of nuts in severe blight years.

When more mature nuts are infected

they may show black sunken spots on the sides and assume irregular shapes. In the late summer this is not considered of economic importance unless the blight penetrates into the kernel.

Other methods of controlling walnut blight are under investigation. Attention is being paid to the effect of changing the timing of sprays on the effectiveness in control. Removal of catkins and artificial pollination with clean pollen needs to be tried experimentally with the view of ultimate elimination of the disease.

A small scale test performed recently points to the possibility of using the latter method of control if a satisfactory selective spray to remove the catkins can be found. In a Payne tree pollinated with clean black walnut pollen the blight was reduced from 85% to 1% and the crop was heavy.

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were deposited. Even under this condition, stands were obtained.

In spite of the very unfavorable weather during the falls and winters of 1947-48 and 1948-49 it was demonstrated that stands can be obtained on the range with this type of seeding. Many stands were lost during those two winters because of heavy frosts and heaving of the soil.

The successful establishment and maintenance of stands of the better forage species through the use of this method of seeding, depend on soil fertility and grazing management. Only poor results—if any—will be obtained on soils which will support only a poor growth of resident annuals. Improper grazing practices can destroy—easily and completely—established stands. As the annuals start maturing and become unpalatable, stock will persistently graze upon the convenient rows of green perennials until the plants are literally eaten out of the ground.

Use of a range planter on productive land located in areas unsuited to cultivation will permit the establishment of bands or strips of the better annual and perennial grasses and legumes over the grazing land. Proper rotational grazing practices can encourage the established strips to reseed and spread.

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