

# PRELIMINARY TRIALS ON THE EFFECT OF MANAGEMENT ON THE ESTABLISHMENT OF PERENNIAL GRASSES AND LEGUMES AT DAVIS, CALIFORNIA<sup>1</sup>

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ANNUAL grasses and herbs constitute a preponderance of the vegetative cover on the foothill ranges of California, although Piemeisel and Lawson (2)<sup>3</sup> concluded from their studies of the vegetation of the San Joaquin Valley that, "the type was originally a cover of perennial bunch grasses." These have now almost entirely disappeared. Weaver and Clements (5) considered *Stipa pulchra* Hitchc. to be the former dominant and this has since been shown (3) to be comprised of two distinct species, namely, *S. pulchra* Hitchc. and *S. cernua* Stebbins and Love.

The chief drawbacks to the annual vegetation in California are (a) the annuals pass through their life cycle very rapidly and set seed and die shortly after the rainy season ends in the spring; (b) the wide fluctuations from year to year in the botanical composition of the annual cover (4) result in range deterioration since the same numbers of livestock tend to be carried in good years and bad; and (c) annuals are not as effective as perennials in preventing run-off and erosion, as has been pointed out by Chapline and Cooperrider (1) and others.

One of the major obstacles to be overcome in improving the range is the re-establishment of perennial grasses. The slower rate of growth of their seedlings is a marked handicap to their survival in a dense stand of resident annuals. In order to determine the effects of different management practices on freshly seeded perennials the experiment described below was set up.

The 27-acre field used for the experiment had been dry-farmed for years prior to 1933 after which it was pastured until 1935. From 1936 to 1942 it was used for increasing cereal varieties, a year of cropping alternating with one of fallow. In 1942 the cereals increased were varieties of wheat, oats, and barley. The soil is a Yolo clay loam and has a high water-holding capacity. The season 1942-43 was normal with respect to the amount and distribution of rainfall, but there were more killing frosts in January than usual (Table 1).

## PLAN OF EXPERIMENT

In 1942, before the advent of the fall rains, the 27-acre field was disked to a depth of 3 or 4 inches and, except for three areas reserved for plots, was seeded broadcast with a mixture of perennial ryegrass, *Lolium perenne* (6 pounds per acre), annual ryegrass, *L. multiflorum* (3 pounds), and bur clover, *Medicago hispida* (10 pounds). In addition, over the field (including the plots) there was a volunteer seeding of wheat, oats, and barley estimated to be at the rate of 25 to 45 pounds per acre. The rains beat in the seed.

Three sets of 34 plots, 10 feet × 43.5 feet (about 0.01 acre) were seeded broadcast November 23, 1942, to five legumes, burnet (a member of the Rose family),

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<sup>3</sup>Numbers in parenthesis refer to "Literature Cited", p. 703.