



A Tough Year but Tougher Plants:

Range Annuals Endure Record Fall Drouth

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THE MANY annual plants that started growth shortly after the record 3.7-inch rain Sept. 19, 1959, gave promise of a very good year in the California foothills. But the next 112 days brought almost no rain. Halfway through this dry spell, the parched grass and filaree on the San Joaquin Experimental Range in Madera County dried up—and so did the rosy prospects.

Between Sept. 19 and Jan. 10, 1960, less than 5% of normal rainfall occurred—.36 inches instead of the expected 7.47 inches. Records kept by Forest Service range researchers for the previous 25 years showed that this was a record fall and early winter drouth. A tremendous number of new plants died and it seemed likely that range herbage production would be as low as or lower than the record low 1958-59 crop.

Spring Rains. Then fairly good rains fell from January through April. The remaining live plants responded and produced an average herbage crop upon which cattle gained well. The ability of these plants to survive the long dry spell

and then, with better conditions, show growth characteristics that tended to "fill in the gap" left by the myriad of dead seedlings proved the adaptability of annuals to rather "tough" conditions.

The shallow soil at the experimental range, like much of the surrounding granitic soil of the Sierra Nevada foothills, was filled with water to near field capacity by the September deluge. Ideal seed germination conditions followed. Within 48 hours, a general green cast was apparent over the entire range.

Rapid Growth. At this relatively low elevation of 1,200 ft. warm temperatures the next few weeks promoted rapid growth of the new plants. A great number of plants of all species appeared. The clovers were as abundant as ever seen. By Oct. 2, 1959, most of the grass plants had attained a height of at least 1 to 2 inches; some reached 3 to 8 inches in favorable spots. Filaree plants by this time were generally ½ inch high but under blue oaks or where mixed with grass were 1 to 3 inches high.

A herd of 99 yearling heifers which

had gained weight through the summer lost slightly for two weeks in late September (see chart above). They stopped grazing the old dry herbage and took new green plants, which were inadequate to produce gain even though supplemented with a cottonseed meal-salt mixture.

Plants Die. October was entirely without rain. The rate of plant growth slowed considerably by the middle of the month and a few plants flowered unseasonally as the moisture stress increased. By the last week of October, a severe dry situation was in full swing and impressive die-off of the advanced seedlings occurred.

Still, cattle gained well from October to mid-January. From that time until mid-March they maintained their weight—satisfactory performance considering that no hay was fed. From October to March they grazed old herbage along with the new plants and took the meal-salt mixture at an average rate of 1½ lb. per head per day.

From mid-October until substantial rains came in January, only the "fittest" plants survived. The grasses at first wilted

and then, when conditions worsened, their leaf tips and many of the leaves actually turned brown and dried up. Many plants died, but scattered ones still contained a spark of life in the stem near ground level.

Less Hardy. Clover plants responded in much the same way but were less able to survive than grass plants. Filaree leaves curled and dried up, too. The only green leaves remaining formed tight rosettes close against the ground. Many of the filaree plants actually died but in general they appeared better equipped than grasses and clovers to withstand the drouth.

After 96 rainless days, light rain eased the situation in late December. However, it took 10 days of plentiful rain and favorable temperatures in mid-January to revive the remaining plants. New growth appeared in both grass and filaree plants that looked nearly dead. Even clover that appeared to be completely dried up put out new leaves.

Density Reduced. By the end of January it was plain to see that the number of plants per unit area (density) had been reduced to seriously low levels, especially on the shallow soil areas so common in the foothills. Favorable spots and protected slopes maintained fairly high density, but from 30 to 40% of the range had less than 40 grass and filaree plants per square foot—a small fraction of normal density. At the start of growth in September there had been several thousand plants per square foot on most sites.

In January the small surviving plants did a poor job of covering much of the ground surface, especially on the south slopes. A little additional germination occurred but it was spotty. With abundant moisture in February and March and warmer temperatures in March, the "single shoot" aspect of the surviving plants began to change.

Spread. Remaining grass plants began to tiller or produce new vegetative shoots from the base. Five to 10 separate shoots from each grass plant were common. Many of the annual grasses actually resembled perennial bunchgrasses. Filaree was now the dominant plant on many areas and a "filaree year" was a certainty.

Filaree was least affected by the drouth, apparently because of a better root system than the grasses. On low density areas, filaree plants spread out and filled in the large areas of bare soil. The result was that plants soon covered the blank interspaces to such an extent that the percent of ground cover reached a satisfactory level and further improved during the flush of growth in March and April.

Excellent Gains. The adequate green season started March 13 when the range was able to carry cattle at a desired stocking level without supplements. The season was about six weeks late, but it lasted into late May. Cattle made excellent gains from March through May. Early in the green season, cattle grazed the rather abundant crop of popcorn flower, fiddleneck and other forbs as well as filaree and grass. Later, virtually all of the grazing load was carried by filaree and grass.

Herbage production, measured in May, was average. A repeat of the low-production 1959 season, which had seemed so likely in January, did not occur. This is how 1960's herbage crop compares with other years:

Year:	Herbage Production (pounds per acre, air-dry)
Average (past 11 years)	1,590
1951 — highest	2,600
1959 — lowest	690
1960 — near average	1,500

Altogether, annual plants showed remarkable ability to survive unusually long fall drouth and respond well to timely winter and spring moisture. Of course, we are not yet out of the woods. During dry summer months the filaree and forbs will shrink and shatter. But at least a repetition of 1959's record low feed year was avoided through the extreme adaptability of the annual plants.

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