



Graph 2. Frequency distribution of 300 capsules of flax from each of three varieties (Imperial, New River and an experimental variety) on the basis of the number of seeds per capsule.

capsules showed another small but distinct increase.

Observation of the daily appearance of blooms in the field showed that for about three weeks, from April 7 to April 27, blooming had almost stopped in all varieties and that it started again towards the end of that month. This indicated that the total capsule load appeared in a large initial cycle followed by a smaller second cycle. The period during which the number of capsules had leveled off corresponded to, and obviously resulted from, the period of no bloom.

Variability

In spite of the genetic purity and uniformity of the seed a great deal of variability existed among the single plants of

each variety in regard to the number of capsules per plant throughout the sampling period. At maturity, the range was from 34 to 118 capsules per plant in Imperial and from 24 to 188 in New River. This excessive variability due to plant competition was a surprise. Had it been anticipated, more than 20 plants would have been harvested per sample on each harvest date to reduce the experimental error. As shown in graph 1, differences among varieties were quite noticeable. Imperial had the lowest capsule load throughout the growing period but entered the second bloom period earlier. New River had a longer "rest" period between first and second bloom than Imperial; however, it entered the rest period with a greater capsule load. The experi-

mental variety had the sharpest increase in capsule load in the first bloom but the longest rest period and the smallest increase in load during the second bloom.

Seeds per capsule

The next problem considered was the number of seeds per capsule. A normally developed capsule of flax has 10 seeds. More have been observed in rare cases, but finding fewer than 10 seeds per capsule is a common occurrence. To obtain information on the most frequent number of seeds per capsule, 10 capsules were taken at random from each of 30 mature plants from each variety. As shown in graph 2, a rather small proportion of capsules had the full complement of 10 seeds. The mean number of seeds per capsule was 7.12 for Imperial, 6.92 for New River and 6.99 for the experimental variety. It should be noted that yield estimates made on this test indicated that all three varieties yielded in excess of 60 bushels per acre.

The above data confirm the presence of more than one cycle of blooms and capsules in flax. The data also point to the need for more experimentation to find what determines the appearance of distinct cycles of bloom, their magnitude and whether varietal differences exist in this respect. Similar information on the mean number of seeds per capsule would also be valuable. Experiments are now underway to provide information on these problems which may contribute to higher yields of flax.

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BREEDING ALFALFA WITH RESISTANCE TO PHYTOPHTHORA ROOT ROT

PHYTOPHTHORA ROOT ROT has become one of the most important diseases of alfalfa in California. It is particularly a problem on heavy, poorly-drained soils, or on any soil where a layer of free moisture persists for some time after irrigation. Leaves of the diseased plants turn yellow and eventually the plants die. Reddish brown lesions are found on the roots of the infected plants with the woody tissue of the root showing a yellowing above and below the lesion. Improving the drainage is the best control for the disease, but in some soils this may not completely solve the problem.

A survey of alfalfa varieties and introductions for resistance to the disease was made by the Departments of Agronomy and Plant Pathology. No variety was found to be completely resistant to the disease, but an introduction from Arabia contained some plants with a good degree of resistance. Of the commercially-grown varieties, Lahontan proved to be most resistant. Field experiences have shown that the resistance of Lahontan can be of considerable value in some fields. The Arabian selections have no desirable characteristics except for their *Phytophthora* resistance, however, and some time will

be required to transfer this character to acceptable varieties.

Recently, a number of plants were selected by William Salle, Farm Advisor in Tulare County, from a plot of Calaverde where *Phytophthora* had severely reduced the stand. These plants were transferred to Davis and their offspring were tested for *Phytophthora* resistance. Some of them proved to be as resistant as Lahontan. It is hoped that reselection from this material will produce a still higher level of resistance that will be useful until the superior resistance from the Arabian selection becomes available.—*E. H. Stanford, Department of Agronomy, University of California, Davis.*