

reduced. Subclover germination remained the same as the check when the rate was 0.3 pound per acre, but was reduced somewhat at the higher rate. The only effect of spray volume—not shown in the table—was on normal germination of rose and crimson clovers. There was a definitely higher percent normal germination of these two clovers at the 0.3 pound per acre rate with 100 gallons per acre volume, than with 10 gallons per acre volume when treatment was made on May 22. This was not so at the 3.0 pounds per acre rate. The high volume appeared to be less injurious only in this case.

Data for the plots in which rose and subclovers were planted together—not shown in the table—indicate that subclover is even less affected by 2,4-D when it is in mixture with rose clover. For instance, the dry matter production

of subclover was actually increased when in mixed stand by the low rate of 2,4-D applied on April 17. One possible explanation is that 2,4-D had a more severe effect on rose clover and, in lowering its competitive ability, allowed the increase in subclover in mixed stands. Another possibility is that rose clover offered protection for the lower-growing subclover by interception. In almost all cases subclover benefited from its association with rose clover when 2,4-D treatments were applied.

### Experiments Compared

Although the dry matter yields of the clovers were considerably less in the range experiment, the relative reduction due to 2,4-D treatments was comparable in the two experiments. The first spraying of both experiments caused

similar results, while the full bloom—May 23—treatment in the range experiment was slightly more injurious than the late bloom—May 22—treatment in the cultivated experiment.

Seed yield of rose clover was reduced relatively more in all treatments in this range experiment than in the cultivated experiment. Seed yields of subclover were comparable in the two experiments. The percent of normal germination was much higher for subclover from all treatments of the range experiment but this was probably due to lower natural dormancy in the seed from the range experiment.

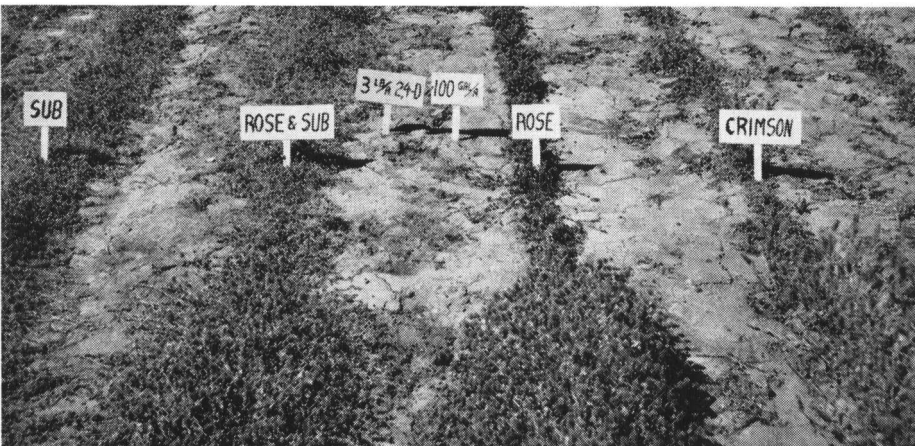
Forage production of rose, subterranean, and crimson clovers is reduced by application of 2,4-D at early growth stages but is generally unaffected by treatment at late stages. Seed production is at a minimum with early bloom treatments and normal germination is at the lowest level with full bloom and late bloom treatments. Subclover is strikingly more tolerant to 2,4-D applied when the clovers are actively growing than are rose and crimson clovers. The effect of high spray volumes in increasing percent normal germination of seed from plants treated with a low rate of 2,4-D is also of interest, as is the enhancement of growth of subclover in mixture with rose clover after 2,4-D treatments.

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**Annual clovers treated with 3 lbs/A 2,4-D on April 17 in background as compared with unsprayed plants in foreground.**

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## Collapse in California Woods

Collapse in lumber—an extreme form of shrinkage which causes large volume losses and is accompanied by warping and splitting—is being studied in order to find ways to rehabilitate wood that has collapsed during drying and to develop a practicable technique to prevent collapse.

Some California redwood and incense cedar are prone to collapse and require

careful treatment. Collapse is a major factor limiting the commercial development of California hardwoods, and also prevents application of accelerated drying techniques to these species.

To rehabilitate collapsed wood the study aims at developing principles of permanent dimension recovery by simple treatments such as steaming at the end of drying, and determining the ap-

propriateness of the process for California woods.

Prevention studies embrace a fundamental approach to determine the mechanics and nature of collapse in wood. As a first step, the water in green collapse-susceptible wood is being replaced by organic liquids with specifically chosen properties. The analysis of the drying behavior of wood so treated enables the development of working theory and simultaneously provides leads for collapse prevention treatments. As collapse occurrence is intimately related to the relative permeability of wood, a second study—on the permeability of California woods—is partially oriented toward an understanding of collapse phenomena.

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