

# Hard seed ensures rose clover survival

Rose clover, first tested in California in 1944, is now one of the state's most important rangeland forage plants. Ripe seed, when ingested by cattle and then passed, remains viable in manure for at least a decade and possibly much longer, with some seeds germinating each year when conditions are right.

In an investigation of seed viability, manure was collected during 1957 in San Diego County from cows that had eaten mature rose clover. The dried "chips" were isolated from other sources of seed in a sealed container. Each fall thereafter, the container was opened and placed outdoors so that rainfall germinated some seeds. As the plants matured, blossoms were removed to prevent any additional seed from forming. The containers were then sealed and stored until the next season.

Rose clover seed in the manure samples germinated each year from 1958 until the winter of 1981-82, when the store of viable seeds was apparently exhausted.

In the San Diego County demonstration, it is conceivable that seed viability may have been increased in comparison with natural conditions, because the manure samples were stored in a protected place during part of the year. However, a similar demonstration in San Joaquin County achieved comparable results with manure samples that were continuously exposed to the weather. In this case, cow chips were collected from a field of rose clover seed, and representative samples were

analyzed at the University of California, Davis, with these results:

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|---|-------|
| Average number rose clover seeds per chip | 6,500 |
| Initial germination                       | 5%    |
| Not viable                                | 10%   |
| Hard seeds                                | 85%   |

Two of the manure samples were placed in a box exposed to the weather, and seed heads were removed each year before maturity. Vigorous rose clover plants appeared each season for 10 years, when the demonstration was terminated after the box and chips had completely disintegrated.

The ability of rose clover seed to remain viable for a decade or more after going through the digestive system of a ruminant is, of course, directly related to the high percentage of hard seeds. In fact, a high percentage of hard seeds would seem to be an important characteristic for a successful annual range legume.

This is particularly true in rangelands where the rainfall pattern is highly variable. For example, rainfall at the Tule Springs site in San Diego County varies substantially from year to year, as well as within seasons (see graphs). In addition, after the first fall rains, six to eight weeks of drought are common, which severely affect seedling survival and, of course, stand persistence.

Under these highly variable rainfall patterns, the ability of a range plant to produce a majority of hard seeds each

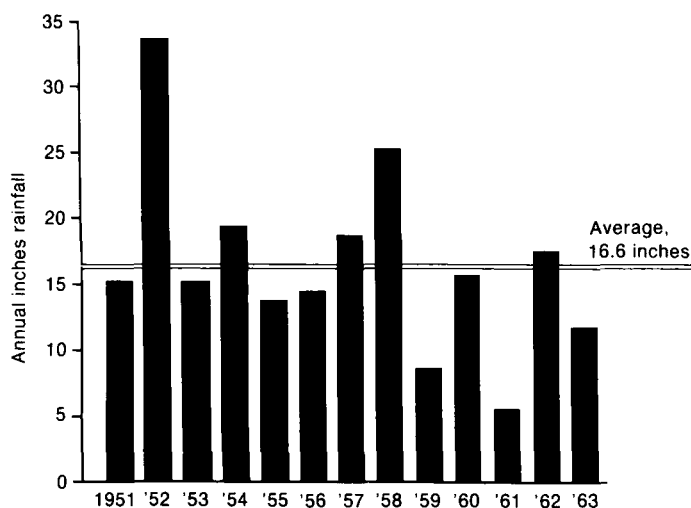
time a seed crop matures would provide an advantage for species adaptation and persistence. During a year of scarce rainfall, most seeds of such a species would carry over to a possibly more favorable season. When early fall rains germinate some seeds, followed by a drought that depletes soil moisture and causes seedling failure, hard seed carryover would be even more important.

Rose clover has this important hard seed characteristic, which accounts, to an important degree, for its ability to produce and persist in California's highly variable range and brushland climate.

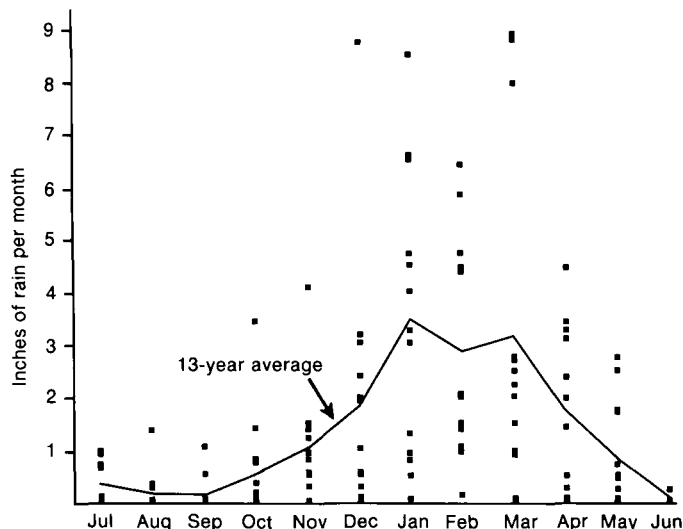
The demonstrations of seed persistence in cow manure also suggest the possibility of introducing the plant into rangeland by feeding mature rose clover hay to cattle or by grazing them on mature rose clover, just before moving them to unseeded range. This has, in fact, been verified by W.H. Johnson, Farm Advisor, Shasta County, who reports finding rose clover well established at a 4,300-foot elevation, 41 degrees N latitude, from seed brought there by cattle that had been grazing an old stand of rose clover at a 3,000-foot elevation. This characteristic makes the plant particularly useful in rough, inaccessible areas.

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13-YEAR SUMMARY OF RAINFALL, TULE SPRINGS EXPERIMENTAL RANGE, SAN DIEGO COUNTY

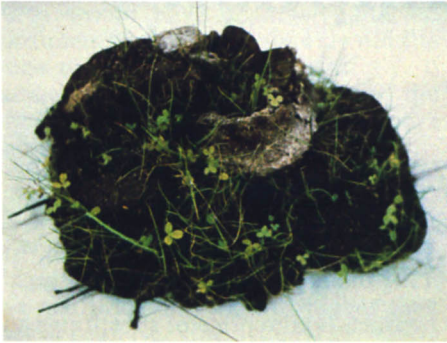


13-YEAR SUMMARY OF MONTHLY RAINFALL, TULE SPRINGS EXPERIMENTAL RANGE, SAN DIEGO COUNTY



# on rangeland

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*Rose clover seeds germinated for over a decade after passing through the digestive system of cattle.*

