

EVOLUTION OF A NEW FORAGE VARIETY

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It takes from **11 to 14 years** to develop a new forage variety from the initial selection of desirable plants to when the final product is sold to the farmer.

Three phases are required:

- Developmental:** Selection and incorporation of desired characteristics into new plants.
- Testing:** Field, laboratory and animal testing to determine superiority of new variety.
- Increase seed:** Increase seed supply to provide sufficient seed to the farmer.



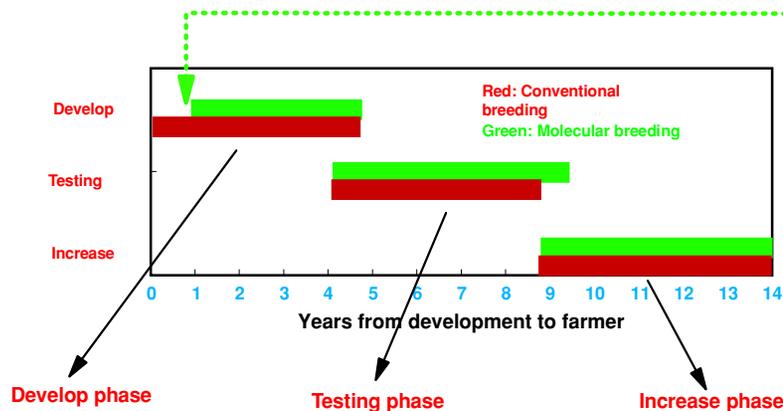
Molecular breeding:

For example, the insertion of a gene for insect resistance

Insert the gene at this time in the program

Note:

The time it takes to develop a new forage variety using either the conventional or the molecular approach is approximately the same number of years. The developmental phase may be a little shorter using molecular breeding approaches, but the testing phase is generally longer due to testing for the expression of the new characteristic and to additional testing required by federal regulations.



Inoculation with disease to select resistant plants (above) and selection for persistence and winter-hardiness (below).



Intercrossing resistant and persistent plants for further selection and development



Field evaluation of new variety for yield, persistence and pest resistance.



Evaluation of new variety for animal acceptance and performance through grazing (above) and feeding trials (below).



Starting with 2 to 3 pounds of initial seed (above), the plant breeder has to get two or three years of seed multiplication to develop enough seed (about 1.5 million pounds) for the farmers to grow.



Using the conventional system, plant breeders at the U.S. Dairy Forage Research Center have improved the yield of red clover, a forage legume, twofold over the past 35 years (See figure below). In addition, the longevity of stands of red clover have increased from 2 years to 4 years over that time.

Forage production of red clover resulting from five decades of breeding for persistence and disease resistance



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