The Future of Alfalfa: Understanding GMO Traits and Their Impact on Production and Marketing

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Breeding for Improved Forage Yield

Selection for improved forage yield is based on the following objectives:

1. Improved forage yield
2. Improved persistence
3. Improved disease resistance
4. Improved chemical composition

Forage Yield Trials

Small plot replicated trials are used to evaluate forage yield and persistence. Trials are conducted at several locations across the U.S. and are evaluated over a period of 3-5 years.
Current Industry Practices

2. A second greenhouse test measures plant growth under a defined high salt irrigation regime of 50mM NaCl (photo right).

   - This six-month forage test is designed to measure forage production potential under saline conditions.

Breeding for Salt Tolerance

- We have identified field testing
  - to better understand the complexity of alfalfa growth and development in saline/sodic/saline soils (combination of stresses);
  - and to validate the efficacy of the greenhouse salt test.
- After two years in this nursery >90% of the plants were dead or dying
  - with little difference between those selected for salt tolerance in greenhouse tests and those with no such prior selection.

FGI Salt Testing Locations

1. Touchet, WA
2. Nampa, ID
3. White Lake, SD
4. Blue Gulch, ID
5. Rocky Ford, CO
6. West Side, CA
7. Maricopa, AZ

2013 Salt Forage Trial
Rocky Ford, CO

Forage yield trial
Forage nursery

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The Results - HarvXtra-003
- Maintained lower forage content than conventional pea varieties;
- Consistently higher in nutritive value when harvested on a normal harvest frequency;
- Maintained high nutritive value for up to 10 days longer than conventional high-quality alfalfa varieties;
- Produced greater yields than conventional varieties when delayed 10 days longer.

Future of Alfalfa Improvement
- Alfalfa genome sequencing fully enabling use of molecular markers and whole-genome selection for enhancing native traits;
- A combination of breeding, genomics, and CRISPR techniques will be used to improve alfalfa's genetic potential, providing new opportunities.

The Future of Alfalfa
- Improved resistance across tolerance (e.g., drought and salinity).