



RRA Update-U.S.

- February 2011 USDA deregulation (US)
 - 2011, 2012 sales
 - Hay & Forage Grower reader survey – 25% intended use.
 - Actual RRA trait penetration slightly higher than H&FG estimate (10-80% based on geography)
 - 2nd generation RRA varieties will be introduced 2013
 - Benefits data (ease of use, improved feed quality and profitability, cost-effective weed control w/o injury) continues to be collected
- NAFA Coexistence Programs
 - Seed Grower Opportunity Zones (GOZ's) implemented
 - Segregate and concentrate GE and APS seed production

RRA Update-Canada

- FGI has NOT made any decision re future commercialization of RRA in Canada
- Regulatory Status update
 - Full food, feed, environmental approvals granted in 2005
 - Label granted (March 2012) to allow the use of Roundup over-the-top on RRA
- Preliminary testing in Eastern Canada to gather benefits data
 - Technology evaluation (RRA vs. alternatives)
 - Product (variety) adaptation and performance
- Assessment of grower and seed company interest in RRA technology now underway

RRA Update-Canada

- Coexistence between “biotech, conventional, and organic forage producers” (diversity of markets)
 - CSTA has formed a committee to develop a coexistence plan for the potential introduction of RRA
 - Coexistence workshop findings key to this plan
- No commercialization in Western Canada until a stewardship/coexistence plan is received from applicable provincial hay/**seed** grower groups
- Agronomic stewardship and stakeholder-approved coexistence plans must be in place before any commercialization decision for Eastern Canada

Reduced Lignin (RL) Alfalfa



Reduced Lignin Alfalfa

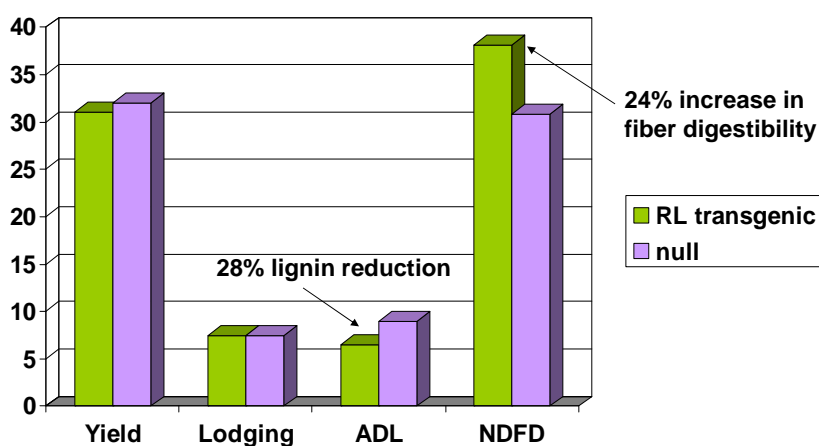
- Lignin increases with advanced maturity in alfalfa.
- Lignin is indigestible, and binds with cellulose/hemicellulose – reducing fiber digestibility.
- Reducing lignin content will increase fiber digestibility
- Genetic engineering can be used to reduce lignin content in alfalfa
 - “knockout” genes for key enzymes in the lignin biosynthetic pathway.

RL Alfalfa Product Concept

- 8-10% increase in whole plant NDFD
 - enables 7 day delayed harvest
- Competitive agronomic performance
 - yield = elite checks
 - no increase in lodging incidence
 - MPR, WH and persistence = elites



2008 Summary – RL1 Alfalfa



Reduced Lignin Alfalfa

- Commercial Product Concept Goals Met
 - Lignin, NDFD and delayed harvest
 - Agronomic equivalence
- Breeder seed of 1st generation RLA 2012
 - Wide scale product testing 2013-2016
- Anticipate that regulatory data package for US and Canada submissions will be ready late 2012
- **Estimated** Commercial Timeline
 - Japan import approval, full launch early 2016

Thank You!

