

Alfalfa Breeding – A History at UGA



Joe Bouton
Professor Emeritus, University of Georgia, Athens

In the USA, the initial phase for breeding new alfalfa varieties centered on developing “public types” containing broad adaptation traits



The Next Step was the “Proprietary” Phase in Alfalfa Breeding

Based on Including Multiple Pest Resistances and Proper Fall Dormancy

Aphids

Note the direct relationship between fall dormancy and winter active growth. Fall dormancies 5-8 work well in the South.

Phytophthora root rot

Picture taken at Eatonton, GA during December

By the 1980s, proprietary alfalfa varieties were mainly being sold, and continue to be developed and sold today, based on their **fall dormancy and different pest resistance ratings**; but also on **complex genetic traits** such as winter hardiness and grazing tolerance.

Winter Survival, Fall Dormancy & Pest Resistance Ratings for Alfalfa Varieties

2004/2005 Edition

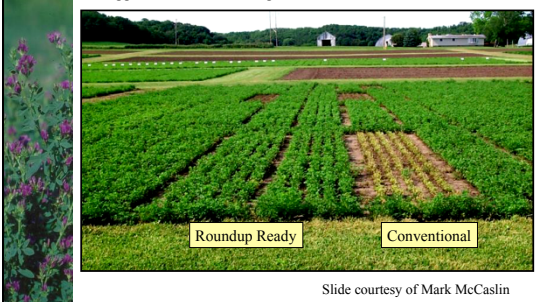
Information obtained from the Association of Official Seed Certifying Agencies (AOSCA), and the National Alfalfa Variety Review Board (NAVVB) Report. Blank spaces indicate variety is susceptible or has not been adequately tested.

Variety	Contact for Marketing Information	Resistance Ratings										Fall Dormancy Ratings							
		FD	WS	HW	Vw	Fe	An	PRR	SAA	PA	BA	SN	APR1	APR2	SIRK	WRKX	PL	MLE	CT
Alpine	Public	2	HS	HS	HS	HS	HS	HS	HS	HS	HS	HS	HS	HS	HS	HS	HS	HS	HS
Alpine 2	Glenn Seed Cooperative	2	HS	HS	HS	HS	HS	HS	HS	HS	HS	HS	HS	HS	HS	HS	HS	HS	HS
Alpine 3	Glenn Seed Cooperative	2	HS	HS	HS	HS	HS	HS	HS	HS	HS	HS	HS	HS	HS	HS	HS	HS	HS

“Technology” Phase of Alfalfa Breeding

In 2004, biotech traits such as Roundup Ready were added to the proprietary germplasm.

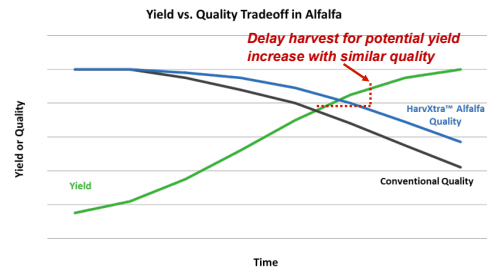
Application 44oz Roundup WeatherMax to Alfalfa Yield Trial



Slide courtesy of Mark McCaslin

Newest Varieties Contain Two Biotech Traits!

HarvXtra™ Trait (Reduced Lignin) Product Performance



Summary of the historical phases in USA alfalfa variety development and marketing

Public Phase

- "For public good" or old public varieties
- Broad adaptation traits
- Non-exclusive release; no patenting or licensing

Proprietary Phase

- General adaptation genetic platforms
- Specific traits (e.g. fall dormancy and pest resistance.) & specific markets (hay or grazing)
- Limited patent protection (PVP)
- Exclusive release and licensing

Technology Phase

- Proprietary traits and adaptation platforms
- Biotech based trait(s)
- Deregulation needed
- Patent protection (utility and PVP)
- Exclusive release and licensing

How to Select a Variety Using Tech Sheet Information

AMERICA'S ALFALFA **Alfagraze 600 RR**

Original dual-purpose Alfagraze with Genulyt[®] Roundup[®] Ready Tolerance

Variety Selection Tool

- Fall Dormancy
- Biotech Trait(s)
- Complex genetic trait(s)
- Adaptation Zone
- Pest Resistances

Quality Dual Purpose for Hay or Grazing

- High yield potential, excellent tolerance and persistence
- Even with patches here there, these varieties for excellent grazing and best recovery
- High resistance to nematodes and Fusarium Wilt
- Best-in-class dual purpose variety for South of grazing
- Developed by Dr. Joe Bouton, Professor Emeritus, University of Georgia

Selected for Survival and Persistence

Genulyt[®] Roundup[®] Ready Tolerance (RRT) is a powerful genetic trait that allows alfalfa to survive and thrive in the most challenging conditions. RRT is a powerful genetic trait that allows alfalfa to survive and thrive in the most challenging conditions. RRT is a powerful genetic trait that allows alfalfa to survive and thrive in the most challenging conditions.

Adaptation Zone	Adaptation Score
Northwest	100
North	95
North Central	90
Central	85
South Central	80
South	75
Southwest	70

AMERICA'S ALFALFA 800.873.2032

Against this historical background, the **UGA Forage Breeding Program at Athens** was begun in 1977:

- It concentrated on developing cultivars of **temperate species such as alfalfa, tall fescue, red and white clovers, and orchardgrass.**
- It became a **large cooperative effort** among different UGA departments and outside commercial partners that utilized the diverse UGA experiment stations network to conduct the main field and animal research studies.



The central feature of the **UGA Alfalfa Breeding Initiative** was incorporating the complex genetic trait, grazing tolerance, into adaptive germplasm along with proper fall dormancies and multiple pest resistances.



Roundup Ready ALFALFA **Biotech Traits were also deployed into future "UGA Alfagraze-Type" varieties**

Alfagraze

Alfagraze 600RR

08/14/2006

08/14/2006

AMERICA'S ALFALFA

The UGA breeding program also continued to develop conventional, proprietary, non-Roundup Ready "Alfagraze-type" varieties such as **Bulldog 505 (fall dormancy 5)** and **Bulldog 805 (fall dormancy 8)** that demonstrate better performance when used in for both grazing or haying in the South.

Bulldog 505 & Bulldog 805
Alfalfa Sold Co.

Roundup Ready ALFALFA UGA Varieties Have Performed Well

Feed and Forage Analysis Reports*

Hay Crop	Relative Forage Quality (RFQ)	Crude Protein**	Total Digestible Nutrients**
1 st cut Bermudagrass + Alfagraze 600 RR Alfalfa	189.9	20.5%	67.2%
2 nd cut Bermudagrass + Alfagraze 600 RR Alfalfa	240.2	25.1%	68.4%
1 st cut Fescue + Orchardgrass	86.6	15.9%	51.4%

*Field locations near Canon, GA
**Measured by Near Infrared Reflectance (NIR) Analysis – reported on Dry Matter Basis
UGA Feed and Environmental Water Laboratory – Athens, GA

Winner of 2014 Southeastern Hay Contest in Perennial Peanut/Alfalfa Hay Category

GotBermudagrass.com AMERICA'S ALFALFA

Inter-Seeding UGA Alfalfa Varieties into Bermudagrass
A New Use and Tool for Bermudagrass Management

UGA On-Farm Program Demonstrated the Value of Managing Bermudagrass by Inter-Planting Alfalfa

Bulldog 805 alfalfa variety interseeded November 11, 2011 into a Bermudagrass field near Valdosta, GA. Picture taken April 12, 2012.

Bulldog 805 alfalfa variety 2nd year stand. Picture taken March 29, 2013.

Bulldog 805 alfalfa variety 3rd year stand. Picture taken April 9, 2014.

America's Alfalfa Southeast USA Demo Sites
Expanding the Existing UGA Program Centered on UGA Variety Alfagraze 600 RR

GOT BERMUDAGRASS?

Why Interseed Alfalfa into Bermudagrass?
 • Great soil conservation
 • Provides the quality of your hay (up to 30% more RFQ possible) in your hay crop
 • Better soil conservation (less soil erosion, less hay crop)
 • Getting well established alfalfa stands in 1-2 years and be harvested about 4-6 times per year (see demo sites)

- Ongoing UGA demos
- ★ Established AA demos
- ★ Commitments to establish AA demos
- ★ Potential targets to establish AA demos

AMERICA'S ALFALFA

Demo Example: America's Alfalfa & UGA Field Day at Roper Demo, Canon, GA, May 2016

Demo Farmer Ricky Roper Reported at Field Day:

- "Used alfalfa to feed young heifers and some cows during winter months at approximately 1 bale each per week along with 4 times the amount of normal grass hay".
- "Fall through Winter Grazing was a good option for me".
- "Cows never looked better in the winter!"

Dr. Joe Bouton

UGA Professor Emeritus, Forage Breeding



Iowa? No, Bulldog 805 Alfalfa in Southern Georgia!
Based on its successful history, and the continuation of the current UGA breeding program, the future for development of new alfalfa varieties for the Southern region looks bright indeed!