



## Piedmont and Eastern NC Organic Broccoli Variety Trial, Fall 2014

Carolina Farm Stewardship Association  
CEFS Small Farm Unit, Goldsboro, NC  
Down 2 Earth Farm, Rougemont, NC  
Redbud Farm, Burlington, NC

### Introduction

The Organic Produce Market Survey, conducted by the Carolina Farm Stewardship Association (CFSA) in 2013, showed that broccoli is one of the leading organic vegetables with respect to sales volume (by weight) in North Carolina. Currently, the majority of organic broccoli sold in the state originates in California. Based on information from the USDA's 2011 Organic Agriculture Census and CFSA's survey, a NC-grown supply/demand gap of 1,329,683 pounds exists (about 94% of total organic broccoli sold here). This creates a significant opportunity for NC producers in a marketplace that increasingly demands locally produced food. Identifying the "best" broccoli varieties for the various geographic regions in NC will enable producers to compete more efficiently with product imported from out of state, and expand access to the \$2 million dollar organic broccoli market.

To address this issue, CFSA and its partners worked with organic growers to conduct randomized and replicated organic broccoli variety trials in the Piedmont and Eastern regions of NC. The hope for this project was to expand on broccoli trials for summer production conducted in Western NC by NCSU staff at the Mountain Research Center organic unit and on-farm sites in the region.

## Variety Selection and Sources

Variety	Source	Days to Maturity
Packman	Harris Seed	55
Green Magic	Johnny's Selected Seed	57
Arcadia	Johnny's Selected Seed	63
Belstar	Johnny's Selected Seed	66
Ironman	Oborne Seed	70
Imperial	Johnny's Selected Seed	71

Variety selection was based on a number of factors. CFSA's 2014 NC Organic Broccoli Survey of growers in the Piedmont and Eastern region identified several of these varieties as being widely used. Varieties were also included to represent those already being grown by one or more of our participating farmers. Each of these six had promising reviews for fall production. Packman served as the industry standard or "check" variety in the trial.

## Trial Locations and Production Practices

Three farms participated in the trial. Redbud Farm (Burlington) and the Center for Environmental Farming Systems Small Farm Unit (Goldsboro) are each certified organic. Down 2 Earth Farm (Rougemont) is managed using organic practices and was actively seeking certification at the time of the trial. Growers conducted the trial using a randomized complete block design with 4 blocks or replications on each farm. Each of the four blocks contained one 40-plant plot per variety. Brassica guard rows were planted on the perimeter of the blocks to reduce edge effect. Refer to the following tables for specific management practices that were employed at each site.

Site	Seeding Date	Transplant Date	First Harvest	Final Harvest
Redbud Farm Burlington	7.14.14	8.20.14	10.16.14	11.14.14
Down 2 Earth Farm Rougemont	7.15.14	8.19.14	9.26.14	10.23.14
CEFS SFU Goldsboro	7.15.14	8.12.14	10.2.14	11.14.14

Site	Transplant Inputs	Transplant Application Rates/No.
<b>Redbud Farm Burlington</b>	72 cell trays Sunshine N&O Potting Mix Neptune's Harvest 2-4-1 Pyganic Mpede Soap	3 TBSP/gal water, weekly 1 TBSP/gal water, once 1/3 cup/gal water, once
<b>Down 2 Earth Farm Rougemont</b>	2" soil blocks Farm-made Potting Mix Elliot Coleman Recipe True Organics Fish Fertilizer 4-1-3	1 oz./gal water, weekly soak before transplanting
<b>CEFS Small Farm Unit Goldsboro</b>	50 cell trays 50% Sunshine N&O Potting Mix 50% compost made on-farm Alaska Fish Fertilizer 5-1-1 Actinovate Fungicide	2 TBSP/gal water, weekly 4 gram /1000 ft2, twice

Site	Field Culture	Field Fertility	Fertility Rates
<b>Redbud Farm Burlington</b>	Bare ground, raised beds 4' on center Single row/bed 12" between plants in row Drip Irrigation	Harmony 5-4-3 Nature Safe Feathermeal 13-0-0 Borax Solubor Sodium Borate 20.5%	12.5 lb / 100' bed 4.5 lb / 100' bed 2 lb in 2 gallon water
<b>Down 2 Earth Farm Rougemont</b>	Bare ground, raised beds 5' on center Two rows/bed 18" b/t plants in row Drip Irrigation	Harmony 5-4-3 Novozymes Green-Relief Compost QB-10 Boron, 10%	12.5 lb / 200' bed 0.5 inch 1 lb/Acre
<b>CEFS SFU Goldsboro</b>	Bare ground beds 5.5' on center Two rows/bed 15" between plants in row Drip Irrigation	Tyson Feather Meal 13-0-0 Great Salt Lake Potassium Sulfate 0-0-50 Southern States Natural Sol Po Mag	40 lb N/Acre 130 lb K/Acre 25 lb Mg/Acre, 51 lb S/Acre

Site	Field Pest Inputs	Application Rates	No. Applications
Redbud Farm Burlington	Dipel DF (Bt)	1 TBSP/ 3 gal water	7
		Entrust (spinosad)	0.5 TSP / 3 gal water
	Mpede Soap	1 cup / 3 gal water	2
		Pyganic	3 TBSP / 3 gal water
Down 2 Earth Farm Rougemont	Dipel DF (Bt)	2 TSP / gal water	1 / week
CEFS SFU	Xentari (Bt)	0.5 lb/Acre	1
Goldsboro	Entrust		
	(spinosad)	0.25g/gal water	1

## Data Collection and Results Summary

Evaluation protocol was adapted from those used during the 2012-2013 trials at the NCSU Mountain Research Center trials, provided by project leaders Jeanine Davis and Margaret Bloomquist. Qualitative data collected included dates of harvest, crown yield (lbs and number of crowns), head diameter and sideshoot yield (lbs/plot). Quality ratings (1-5) were made for each harvested head for the following traits: head color, head firmness, head uniformity, dome shape, bead uniformity, small bead size, and overall quality.

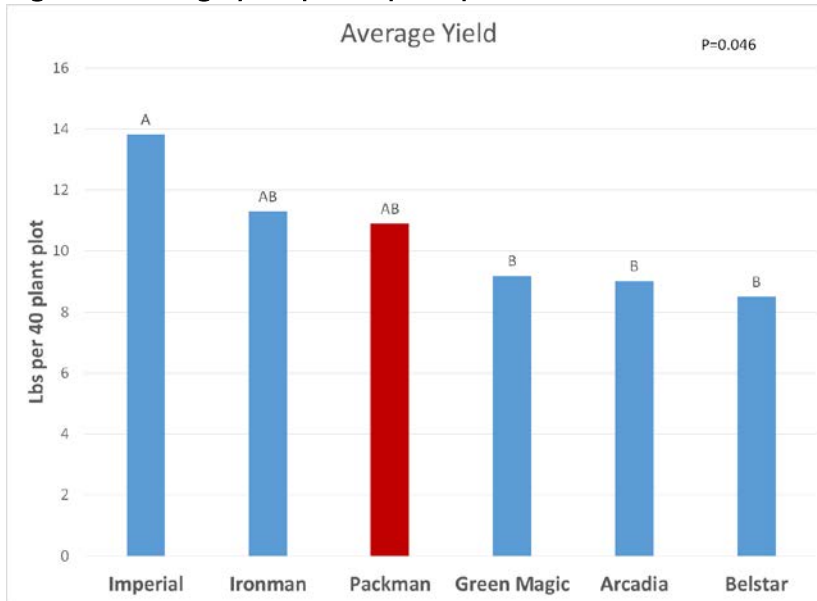
Analysis of data (pooled from all sites) revealed some significant differences in average yield and the quality ratings between varieties. In the figures below, varieties have been given letter designations above their respective bar (A, AB, B, BC, etc) for comparison. Based on the analysis of variance performed (SAS MIXED procedure), varieties that do not share a common letter designation were determined to be significantly different. Significance level is indicated on each figure (P=). For the qualitative traits, each variety was assigned a rank (ex: A=1, AB=2, B=3, etc.) based on how it compared to the other entries. Ranking was also assigned for average yield results. The sum of these rankings are shown in Figure 9.

Imperial, Ironman and Packman were the best performers for yield, respectively. When considering the multiple traits evaluated for quality, Belstar, Ironman and Imperial were consistently at or near the top. Belstar had very high ranking for the majority of rated quality traits, but poorer performance for average yield. Ironman and Imperial seem to be overall top performers when considering yield and quality rankings. Packman consistently held a prominent last place for all but one of the quality ratings.

An early hard freeze for the region on November 14<sup>th</sup> effected potential harvests of varieties with longer maturity periods. This could have made differences in yield more striking, as both Redbud Farm and CEFS Small Farm Unit were still actively harvesting. Because the trial was replicated at each farm (4 reps/farm), analysis of data from each individual farm will be forthcoming and added

to this document as soon as possible. This will allow us to observe differences in variety performance between the sites.

**Figure 1. Average yield per 40 plant plot**



**Figure 2. Overall quality rating across all sites**

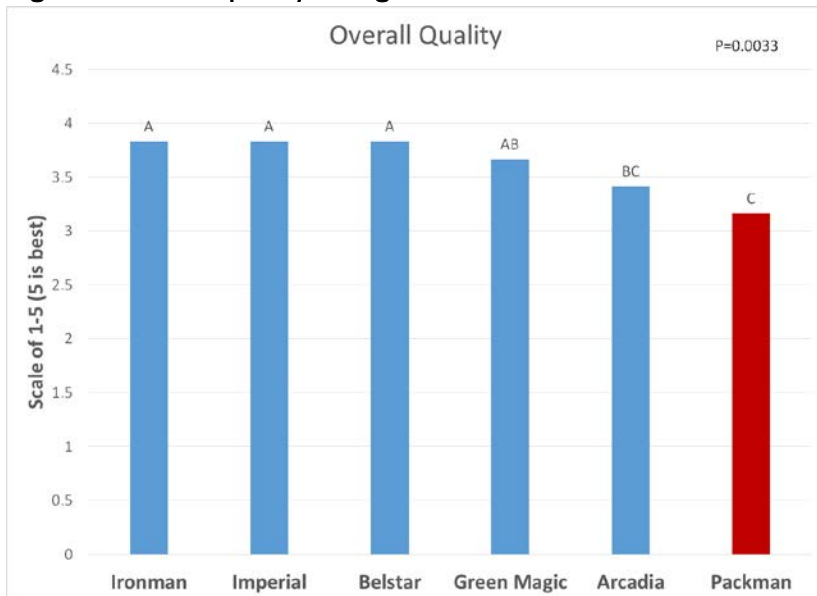


Figure 3, 4, 5, 6. Head quality rating across all sites

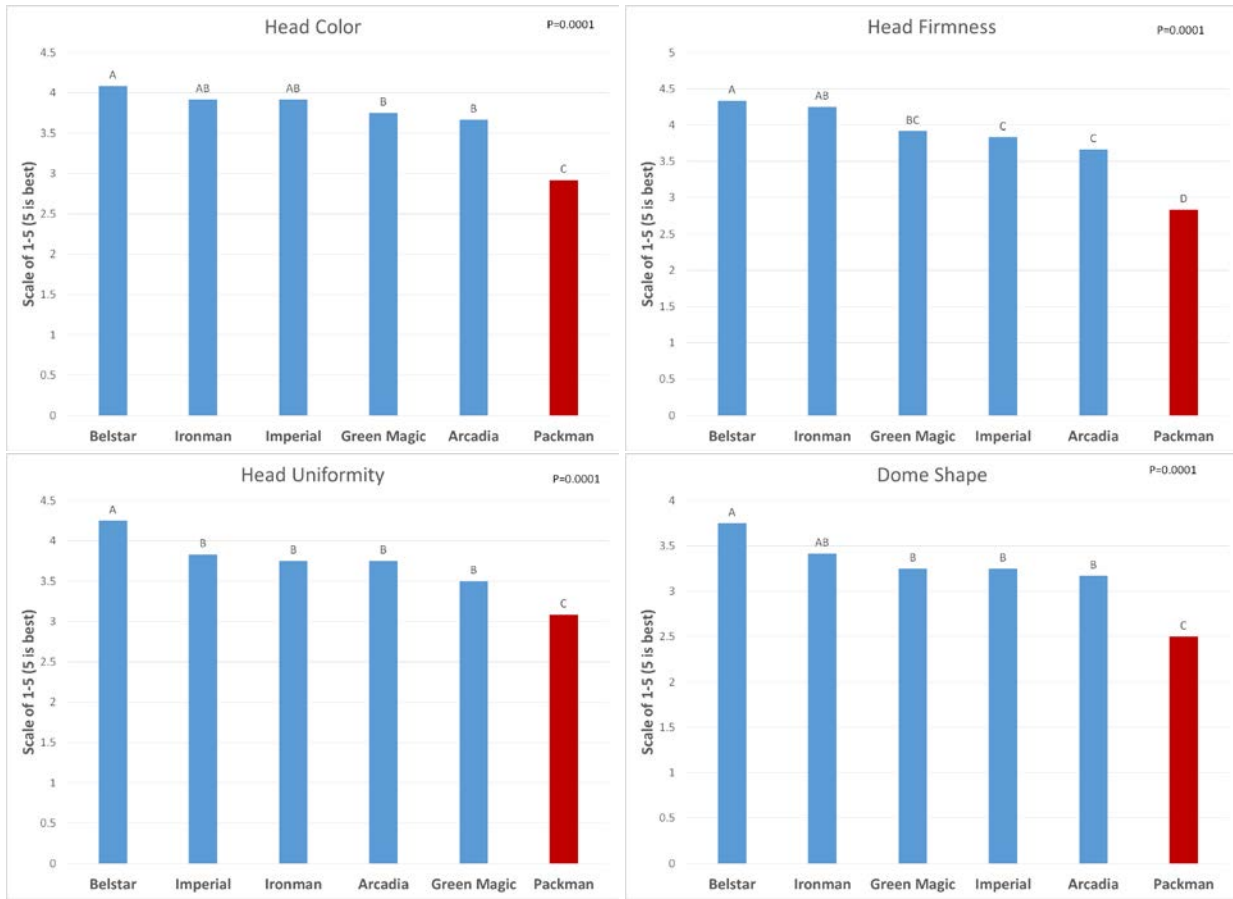


Figure 7, 8. Bead quality rating across all sites

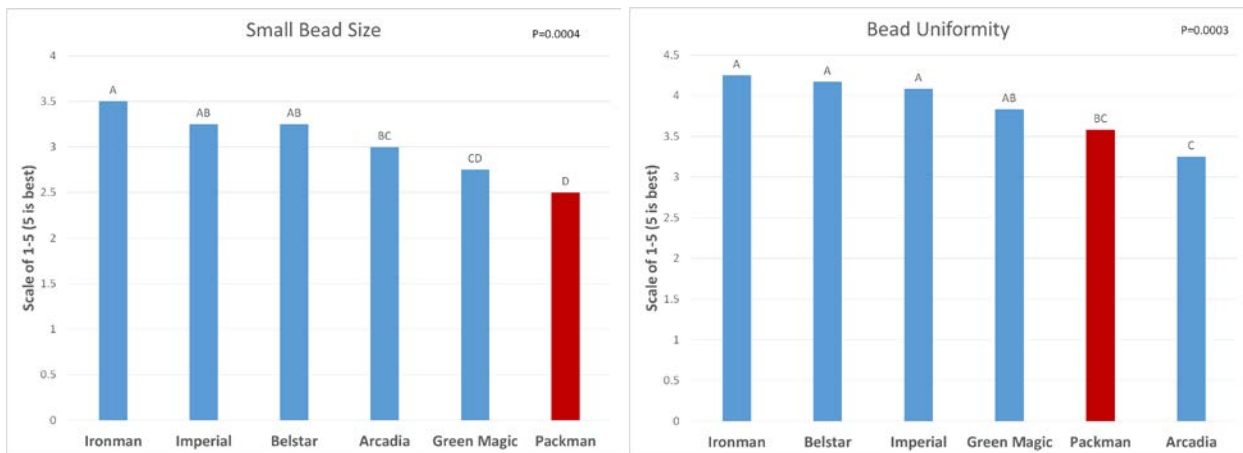
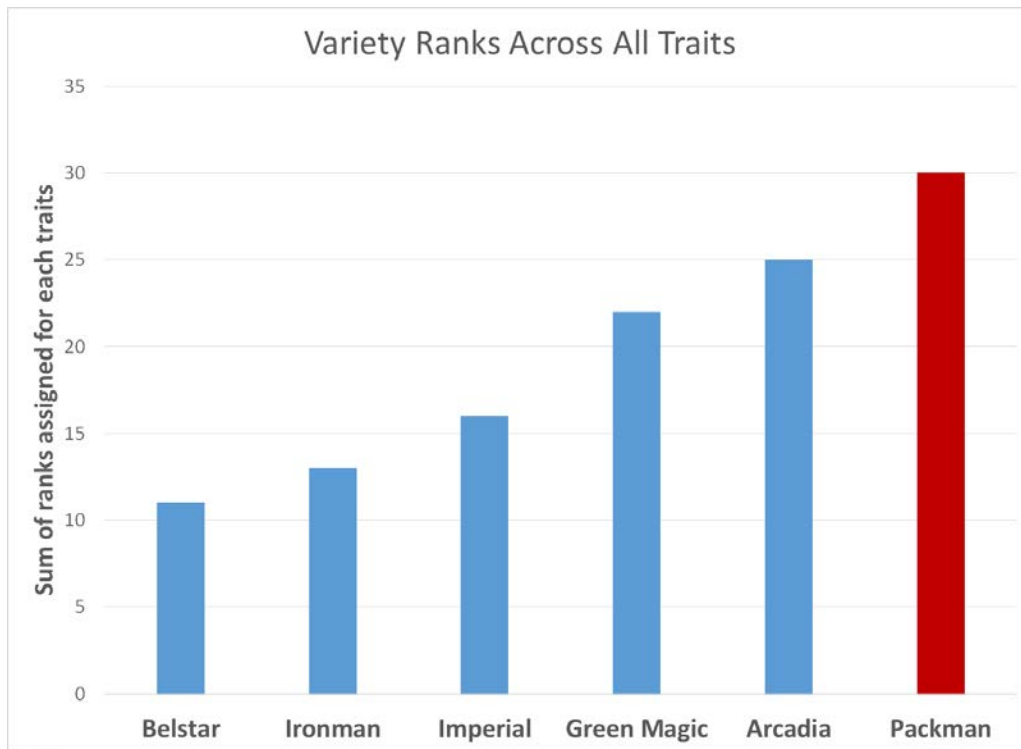


Figure 9. Variety ranks across all traits and sites



The Carolina Farm Stewardship Association thanks CEFS Small Farm Unit, Down 2 Earth Farm and Redbud Farm for permission to use this data in the [Southeast Organic Seed and Variety Trial Report](#).