

# Field Evaluation of Romaine Lettuce Varieties Grown in Southwest Low Desert Soils

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## *Abstract*

*Romaine lettuce plays an important role in Yuma's economy. An estimated 10,000 acres are cropped to large number of varieties each year with planting season that spreads from September to March. The demonstration site was selected to compare new and existing varieties of romaine lettuce on growers' fields using standard farming practices. Selected growth parameters were evaluated throughout the growing season. Results indicate that varieties tested at Barkley Farms in Yuma are expected to do well if grown under similar growing conditions and planting time. Varieties tested during this planting slot did not experience any incidence of diseases. There was no significant head size and head weight difference among varieties evaluated. Number of heads per bed and number of heads left after harvest were significantly different among varieties tested.*

## Introduction

Romaine is the second most important vegetable crop grown in Yuma County after head lettuce. Acreage cropped to romaine lettuce is increasing rapidly every year. In 1995, only 5,600 acres are planted with romaine lettuce, in 2000, an estimated 10,000 acres of romaine lettuce were grown in Yuma, larger than any other county in the State of Arizona. About 12% of total vegetable acreage is cropped to romaine lettuce. Romaine generates about 70 million dollars to Yuma's economy. Yuma growers plant romaine lettuce every day starting late September through March, during this period various romaine varieties were planted. Seed industry is continuously putting new varieties on the market for the growers to plant on their fields. These varieties need to be evaluated under grower field conditions before they are planted on the large scale.

This variety trial program was designed by the University of Arizona to assist growers and seed companies to evaluate new released varieties and commercial varieties tested in Yuma County. Designed to serve primarily for demonstration purposes and field days, these trials are conducted on grower's fields under similar cultural practices. Selected growth parameters were evaluated throughout the growing season.

Growers look for romaine lettuce qualities that include the uniformity of stand and maturity. Small to medium and uniform head size is desirable in order to ease the packing process. It is desirable to have a uniform maturity so growers harvest the whole field at once. Uniform maturity minimizes the number of head lettuce left in the field during the harvest. Good field holding capability and a good crop vigor are other agronomic characteristics considered.

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The objective of this demonstration trial is to evaluate these characteristics and make this program available to growers and seed companies to conduct their own evaluation.

## **Methods and Materials**

Doug Melon's field was the selected location to conduct this variety trial in Yuma near the Yuma County Cooperative Extension office. Ten romaine varieties were planted on November 15, 2000 on two-row beds. First irrigation followed planting on November 19, and subsequent irrigations were December 06, 2000 and January 2, January 26, February 12, and February 22, 2001. Varieties were planted on 42 inch-bed and 75 feet long in completely randomized block design with two replications. Varieties were direct seeded using an Earthway push planter in double rows, planted north-south orientation. A commercial crew thinned all plots at 10 inch spacing. Standard cultural and IPM practices were utilized throughout the growing season.

All varieties had various growth rates. Plant characteristics were evaluated over a period of time during the growing season. Most growth parameters (characteristics) were evaluated on scale from 1 to 5 with 1 as the least desirable and 5 as the most desirable. Parameters evaluated otherwise have their key shown on the upper right of Table 1. Parameters rated on 1 to 5, scale were averaged to give the overall rating. Varieties with an overall rating of 4 and 5 are expected to grow well under similar conditions. Varieties with overall rating of 3 and below may experience some problems. Head weight and head size (diameter) measurement were made at maturity for each variety planted. Plant population before and after harvest was made to determine the percentage of heads left on the field.

Varieties tested were harvested the same day the field variety was harvested on March 2, 2001. Two heads per variety were harvested, trimmed and weighed. Statistical analysis (SAS ver.7) was performed on head weight and head diameter. Table 2 shows the results of the ANOVA and Figure 1 shows means and standard deviation of head size, head weight, population and number of heads left after harvest. The choice of lettuce head weight and head diameter for analysis of variance is based on the current market standard that requires growers to pack 24 heads of lettuce in boxes that weigh 43-48 pound.

## **Results and Discussion**

Planting at Doug Melon field took place on November 1, 2000. This planting slot for the varieties tested corresponds to the slot suggested by seed companies participating in the program. Field variety was Green Forest. The harvest took place on March 2, 2001. Table 1 shows the evaluation made during the growing season. The plant vigor, a field holding capability for some varieties also had a high score. Varieties planted this season showed little incidence of diseases (Table 1). During this planting window, growers in Yuma County did not experience any serious incidence of diseases on romaine lettuce.

In this year's trial, most varieties had an overall rating between 4.62 and 4.87 but one variety had an overall rating of 5. This indicates that these varieties would do well if grown under similar conditions and planting date.

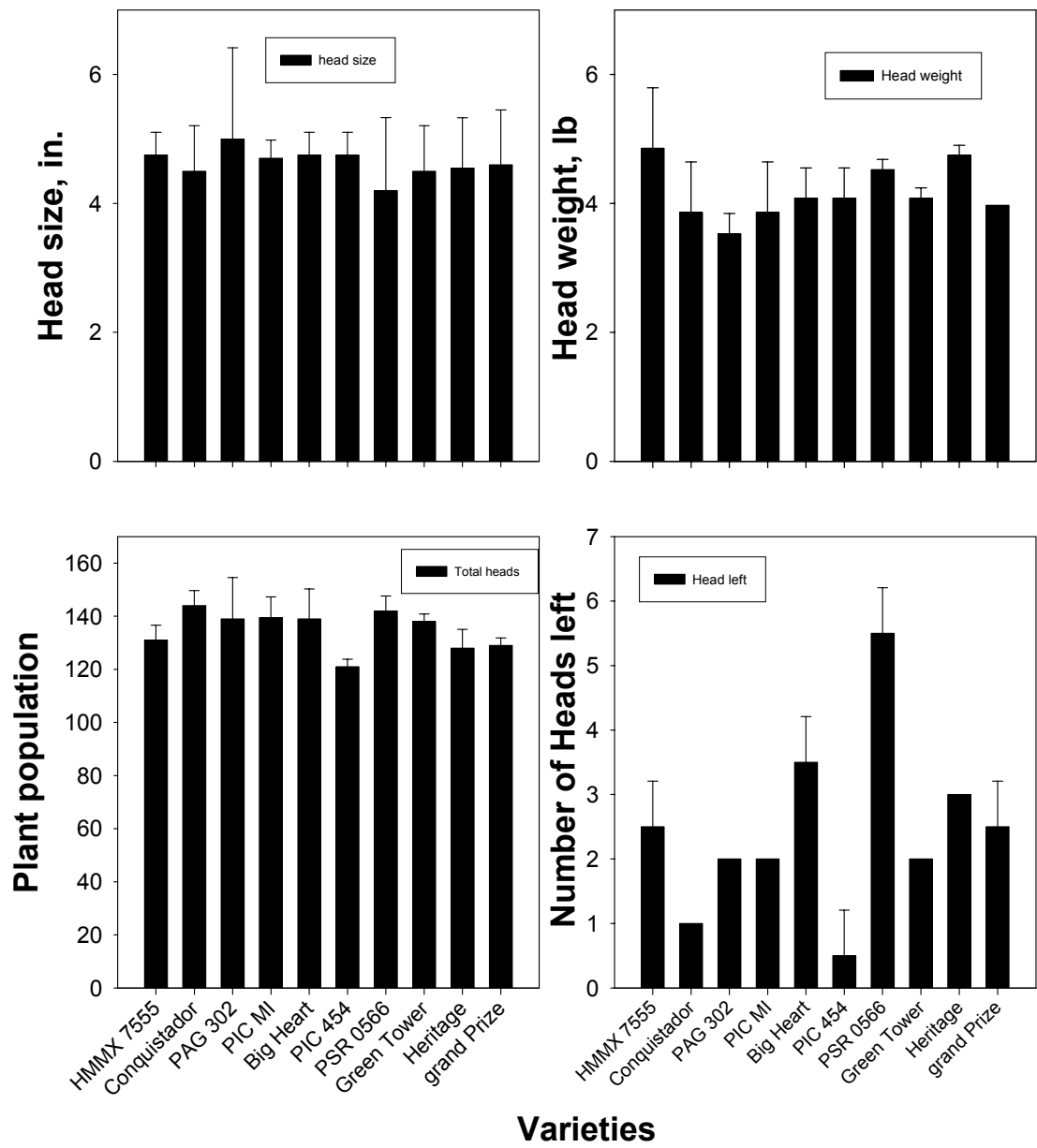
Analysis of variance (Table 2) shows that head weight was significantly different among varieties tested. HMM 7555 had the highest head weight and PAG 302 had the lowest head weight (Figure 1). No significant difference in head size was observed among varieties tested. Number of head population, number of heads left on the field at harvest, and the ratio of head left to total heads per 75 foot-row were significantly different (Table 2). The ratio of plant left after harvest to total plant population is an indication of plant uniformity in relation to size and maturity. Fewer heads were left on the field for PIC 454 variety but more heads were left for PSR 566 (Figure 1).

Table 1. Data summary of observations collected on Romaine variety trial conducted at Barkley Farms, Yuma 2000-01

| Variety                       | Overall Evaluation (a) | Maturity (b) | Uniformity (a) | Color © | Plant Frame (a) | Vigor (a) | Leaf Texture (d) | Butt Appearance (e) | Field Holding (a) | Incidence of Disease (a) | Key:<br>a) 5= the most desirable, 1 least desirable<br>b) M= mature, O= over, U= under<br>c) 5=dark, 4=bright, 3=dull, 2=light, 1=yellow<br>d) 5=savory, 1=smooth<br><br><b>Comments</b> |
|-------------------------------|------------------------|--------------|----------------|---------|-----------------|-----------|------------------|---------------------|-------------------|--------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| HMMX75555 (Harris Moran)      | 4.75                   | M            | 5              | 4       | 5               | 5         | 4                | 5                   | 5                 | 5                        | Nice appearance, uniform stand                                                                                                                                                           |
| Conquistador (Petoseed)       | 4.75                   | M            | 5              | 3       | 5               | 5         | 5                | 5                   | 5                 | 5                        | Nice green color, holding nicely                                                                                                                                                         |
| PAG 302 (Progeny)             | 4.75                   | M            | 5              | 4       | 5               | 5         | 4                | 5                   | 5                 | 5                        | Nice frame, good field holding                                                                                                                                                           |
| PIC MI (Synergene)            | 4.62                   | M            | 4              | 4       | 5               | 5         | 4                | 5                   | 5                 | 5                        | Medium frame, nice color                                                                                                                                                                 |
| Big Heart (Progeny)           | 4.75                   | M            | 4              | 5       | 4               | 5         | 5                | 5                   | 5                 | 5                        | Nice green color, holding nicely                                                                                                                                                         |
| PIC 454 (Progeny)             | 4.75                   | M            | 5              | 4       | 5               | 5         | 4                | 5                   | 5                 | 5                        | Nice frame, little bright in color                                                                                                                                                       |
| PSR 0566 (Petoseed)           | 4.87                   | M            | 5              | 5       | 4               | 5         | 5                | 5                   | 5                 | 5                        | Holding well and uniform                                                                                                                                                                 |
| GreenTower (Harris Moran)     | 4.87                   | M            | 5              | 4       | 5               | 5         | 5                | 5                   | 5                 | 5                        | Excellent uniformity, holding nicely                                                                                                                                                     |
| Heritage (Progeny)            | 4.62                   | M            | 5              | 4       | 4               | 5         | 4                | 5                   | 5                 | 5                        | Little bright, uniform and good texture                                                                                                                                                  |
| Grand Prize (Progeny)         | 4.87                   | M            | 5              | 5       | 4               | 5         | 5                | 5                   | 5                 | 5                        | Excellent color, and uniform                                                                                                                                                             |
| Green Forest ( Field variety) | 4.75                   | M            | 4              | 5       | 5               | 5         | 4                | 5                   | 5                 | 5                        |                                                                                                                                                                                          |

Table 2. Analysis of variance on head size, head weight, population and head left after harvest and ratio

| Source of Variation |   | Head size, inch   | Head weight, lb | Population (a) | Heads left (b) | Ratio (b/a) |
|---------------------|---|-------------------|-----------------|----------------|----------------|-------------|
|                     |   | ----- Pr> F ----- |                 |                |                |             |
| Rep                 | 1 | 0.0147            | 0.2355          | 0.0311         | 0.6780         | 0.9930      |
| Varieties           | 9 | 0.967             | 0.3186          | 0.0704         | 0.0003         | 0.0003      |
| R <sup>2</sup>      |   | 0.56              | 0.61            | 0.78           | 0.93           | 0.93        |
| CV (%)              |   | 12.5              | 12.1            | 4.6            | 21.2           | 20.7        |
| Mean                |   | 4.63              | 1.88            | 135            | 2.45           | 0.0003      |
| LSD (5%)            |   | 1.31              | 0.5172          | 14.076         | 1.180          | 0.0085      |



**Fig. 1. Romain lettuce head size (in.), weight (lb), number of heads before and after harvest in 75-foot row, and standard deviation. Variety trial conducted in Yuma county, 2000-2001**