In recent years, dark greens such as Romaine lettuce have gained popularity because of their health benefits in providing essential vitamins and nutrients. Due to the demand, Hawaii’s importation of Romaine was estimated at 9 million pounds in 2008 (HDOA HASS, 2011). Acreage under Romaine lettuce production in Hawaii increased from 90 acres to 110 acres from 2008-2011. Local crop yields increased from 1 million pounds to 1.7 million pounds. The Romaine lettuce industry has seen an increase in value from $590,000 dollars to $1 million dollars over the same 4 year period, yet there is still much room for expansion.

Lettuce typically grows well in cool climates or during cool seasons. When exposed to high temperatures, lettuce has a tendency to bolt (flower), become bitter in taste and form loose heads. Many of the operations which grow lettuce in Hawaii are located in cooler areas such as Kula, Kamuela, or are grown under hydroponic / greenhouse conditions.

Observational field trials were conducted over several growing seasons to evaluate the growth, horticultural traits, and yield of about 40 Romaine lettuce varieties in Poamoho, O‘ahu, and in Moloka‘i, Hawai‘i by Dr. Hector Valenzuela and Ted Goo in 2011. A summary of the varieties is outlined in the Fall 2011, Hana‘ai Sustainable and Organic Newsletter. Romaine lettuce Variety Trials in Hawaii: Winter, Spring, and Summer Trials (Valenzuela et al., 2011).

Replicated field trials were installed to provide shade (30% shade) to selected romaine varieties during fall and summer conditions. Due to an increase in consumer demand for dark green leafy crops, and industry request to identify Romaine varieties that may be adapted for fresh-cut...
processing operations on Oahu, Sugano and co-workers narrowed down approximately 40 to 6 cultivars with potential for Oahu commercial production.

Row spacing was set at 30 inches, with plant spacing at 10-12 inches. Eight plants were planted per treatment. The 6 inner plants were selected for harvest and data collection. Four replications were conducted in fall 2010 and summer 2011. Concept, Paris Island, Jerico, Fresh Heart, Green Towers and Paramount were selected as the top candidates for commercial production. Paris Island and Jerico served as industry controls, commercial standard varieties. Data was analyzed using Tukey's HSD.

Field data showed higher fresh weight per head yields outside the shade compared to being grown under shade during fall/spring seasons on Oahu. Fresh Heart, Jerico and Concept were significantly higher producers than the remaining 3 varieties. Results suggest that 30% shade is not beneficial in the winter, but is beneficial during the summer (Fig. 1)

A similar trial was replicated at Poamoho to study the potential of promising varieties during summer 2011 and also evaluate the effect of shade on selected Romaine varieties for Oahu production. Contrary to fall production, in summer, there were higher fresh weight per head yields inside the shade compared to outside. Crop quality (blemishes, softness of leaves, etc.) were also elevated under shade. Similarly, Fresh Heart, Jerico, and Concept had significantly higher yields as compared to Green Towers, Paramount, and Paris Island. Implications from this study suggest, shade is only needed for summer cultivation on Oahu. The use of thirty-percent shade can improve lettuce yields and crop quality during the summer months on Oahu, however, the yield differences were not significant (Fig. 1)
Figure 1. Data from replicated field trials at Poamoho to evaluate the effect of shade on selected Romaine varieties for Oahu production.

Previously conducted CTAHR field trials demonstrated select varieties of Romaine lettuce can be grown successfully at low elevations on Oahu. Additional work is still needed to evaluate the acceptability of Romaine lettuce for commercial processors and various production systems (soils, soilless media, hydroponics and aquaponic system).

Twenty nine varieties of Romaine lettuce were selected for field evaluation in November 2013. Jerico, Valmaine and Paris Island were chosen as industry controls, commercial standard varieties. Row spacing was set at 30 inches, with plant spacing at 10-12 inches. Nine plants were planted per treatment and replicated three times. Plants were transplanted in December 2013 (Fig. 2).

Plants were fertilized with 16-16-16 plus minors at a standardized fertilizer rate and treated with
one application of *Bacillus thuringiensis* early in the season to control caterpillar damage. Lettuce was harvested in January 2014. The 6 inner plants were selected for harvest and data collection. Statistical analysis was conducted using the Statistical Analysis Software, SAS 9.1. Data suggest that Jerico remains a high yielding variety (Fig. 2). However, Jerico is not significantly higher producing than varieties such as Valmaine, Ridgeline, Musena, Marilyn, Costal Star, Concept, Defender, Rubicon, Pipeline, Caeser, Valley Heart, Rome 59, King Henry, Ideal Cos, Bali, Topenga, Salvius, and Avalanche. Varieties, Claremont and Spretnak were numerically the lowest yielding varieties. However, these varieties are considered baby romaine varieties and do not produce large heads.

![Figure 2: Mean head weight per variety of romaine lettuce planted November 2013 and harvested January 2014 at the Poamoho Research Station. Letters represent mean separation using Tukeys. Means with the same letter are not significantly different.](image)

While nineteen Romaine varieties were statistically equivalent in production yield, yield data alone is not a god indicator of producer and processor suitability and acceptance. For example, Jerico and Valmaine are consistently top producing varieties, yet the color has not been deemed acceptable for commercial processing operations (Fig. 3).

Varieties such as Mondo, Green Forest, Bali, and Pipeline were prone to stem splitting. Ideal Cos, Marilyn, and Salvius appeared to be more susceptible to leaf spotting and discoloration. A field day was organized and hosted in January 2013 at the Poamoho Research Station. Testimonials from growers and processors confirmed selection and acceptability of Romaine
varieties varies between agri-business organizations. Horticultural characteristics such as leaf color, heart density, core size, head density, post-harvest handling, etc. are all key factors in the decision making process. Implications from these trials suggest varieties such as Caeser, Concept, Costal Star, Defender, Jerico, King Henry, Musena, Ridgline, Rome 59, Rubicon, Topenga, Valley Heart, and Valmaine may be ideal for the home gardener.

Figure 3: Color differences between outer leaves of Jerico (left) and Ridgeline (right)

Continuous identification of promising new Romaine lettuce varieties for commercial production could result in the increase of local lettuce production at low elevation locations around the state. Acceptability of these new varieties by agricultural producers and fresh-cut processing operations could improve the overall sustainability of Hawaii’s diversified agriculture industry by reducing our dependence on mainland imports.

References


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