Introduction

Temperature is often the main limiting factor in determining whether a broccoli variety can be grown successfully within a particular region. High temperatures introduced during pivotal points of the growing cycle can render a broccoli head unusable. Since most commercially available cultivars are bred for production within mild climatic regions such as the Salinas Valley in California, the need to conduct screening trials to identify more heat tolerant broccoli cultivars is essential to ensuring the long term viability of the broccoli industry in Oregon.

What broccoli line was the Best? That depends upon priorities. From the perspective of commercial growers and farmers, heat tolerance alone does not make a broccoli variety suitable for large scale field plantings. More often than not, yield becomes of paramount concern for growers, while aspects of head quality and processing characteristics, such as floret size, are the main concerns of the vegetable processors.

Several commercial lines did perform reasonably well across the given environmental conditions of the summer of 2020, and scored high in many of the evaluation criteria. Broccoli hybrids originating from Sakata and Seminis seed companies (e.g. Lieutenant, Castle Dome, Eastern Crown, Eastern Magic) performed well and consistently produced acceptable yield and quality, but may lack other desirable traits such as head exsertion, which allows for ease of field harvesting. Other cultivars with consistent performance across the season were Kings Crown (Tainong Seed) and Asteroid (HM Clause). A summary table of the 24 broccoli lines trialed, and how they performed within each evaluation criteria can be seen in Figure #3.

Some of these broccoli hybrids have been historically known as being very tolerant to heat, and originated from established commercial seed companies. While others, also being described as heat tolerant cultivars, did not perform well in several of the categories associated with head quality.

Methods

The strategy used for examining the climatic suitability of a broccoli variety was to use multiple planting dates throughout the hottest segments of the growing season. A variety would be considered climatically adaptable if it’s able to grow well across this spectrum of growing temperatures, facilitated by having six planting dates spaced one week apart. The seeding of the 1st broccoli planting was initiated inside OSU greenhouses on May 5th, and 4 weeks later, the best 10 seedlings were transplanted into field plots using a transplanter. Seeding continued each week until June 9th. When heads reached a prime stage of maturity, the head was harvested individually and evaluated for the criteria designated as being relevant to assessing the level of heat damage which occurred. Evaluations of head quality consisted of rating each head for: 1) color uniformity, 2) head uniformity, 3) head firmness, 4) head diameter, and 5) head diameter. With each head being harvested individually. With yield being of paramount concern for local broccoli farmers, the weight of each head (i.e. cut to 6.0 in length), weight of total florets, and weight of usable sized florets (< 2.5 in) was also incorporated into the evaluation criteria. The number of days required to harvest a given planting can also estimate the cultivar’s propensity for maturing uniformly. This trial was conducted during the summers of 2019 and 2020 in Corvallis, Oregon.

Figure 1. High temperatures can greatly affect the head quality of many broccoli cultivars

Photo 1 (above). Trial site as seen on July 20th, 2020 –OSU Vegetable Research Farm, Corvallis, OR

Figure 2 (above). Summary chart of performance within several categories of broccoli quality ratings

Key Findings

What broccoli line was the Best? That depends upon priorities. From the perspective of commercial growers and farmers, heat tolerance alone does not make a broccoli variety suitable for large scale field plantings. More often than not, yield becomes of paramount concern for growers, while aspects of head quality and processing characteristics, such as floret size, are the main concerns of the vegetable processors.

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Figure 2 (above). Summary chart of performance within several categories of broccoli quality ratings

Figure 3 (above). Description of the 10 elements of quality and performance ratings used for summary chart in Figure 2

References