Fruit Quality Characteristics in Second Generation (F2) Hybrid Cultivar of Minipaprika (*Capsicum annuum* L.)

Binod Prasad Luitel, Taeck Jong Lee, Tserendendev Oyuntugs, and Won Hee Kang*

Department of Horticulture, Kangwon National University, Chuncheon 200-701, Korea

Abstract: A field experiment was conducted to examine the fruit quality characters in second generation (F2) hybrid cultivar and to compare the fruit characters with original F1 hybrid cultivar of minipaprika (yellow and orange type) at the Research Farm, Hwacheon in July, 2010. Fruit characters varied within F2 population of each minipaprika type. In minipaprika yellow, fruit weight varied from 12.2 g to 50.8 g (average 28.5 g) and fruit length/width varied from 1.4 to 2.8 (average, 2.0). Pericarp thickness ranged from 1.8 mm to 4.1 mm (average, 2.9 mm). Total soluble solid (TSS) varied from 6.2ºBrix to 13.5ºBrix with an average of 8.7ºBrix. Fruit volume varied from 10.3 cc to 46.7 cc with an average of 24.4 cc. In minipaprika orange type, fruit weight ranged from 19.7 g to 42.4 g (average, 29.0 g) and fruit length/width varied from 1.5 to 2.6 (average, 2.0). Pericarp thickness varied from 2.1 mm to 4.1 mm with an average of 3.0 mm. TSS varied from 5.0ºBrix to 12.2ºBrix (average, 7.9ºBrix) and average fruit volume was 24.6 cc ranging from 10.7 cc to 35.0 cc. The average fruit quality characters in F2 population in both yellow and orange minipaprika did not differ from their F1 hybrid parent and F2 seed can be an additional way to supply high yielding hybrid cultivars at lower cost to the minipaprika growers.

Key words: Second generation (F2), F1 hybrid, Total soluble solid, Pericarp, Fruit volume

INTRODUCTION

Sweet pepper (*Capsicum annuum* L.) is an important vegetable crop in Korea. Minipaprika has been widely cultivated throughout the country. The country produces 32,778 t of paprika with an annual increase in production of 13.5% (MFIAFF, 2008). Now, minipaprika has become an important exportable commodity with increasing market demand.

So far minipaprika cultivated in Kangwon Province is mainly F1 hybrids and Dutch varieties are predominantly grown in commercial scale. Unavailability at the right time of planting and high price of F1 seeds of minipaprika varieties are the major bottlenecks for its commercial production (Personal communication). The introduction of F1 hybrid cultivars has dramatically influenced crop production (Coors and Pandey, 1999). Heterosis or hybrid vigor produced by F1 hybrid cultivars can increase yield and crop uniformity for maturity and quality (Bosland, 2005). However, the high cost of exotic F1 seed has also limited the production and F1 cultivars have not developed in Korea yet. Shrestha *et al.* (2010) reported the development of F1 cultivars in paprika from inbred lines. But the maintenance of inbred lines and the cost of producing F1 hybrid cultivar are also too expensive. So far, the second-generation hybrid (F2 hybrid cultivar) has not received as much attention as means of cost-effective hybrid of minipaprika cultivars in Korea.

Curtis (1941) observed that the F2 generation of *Cucurbita pepo* L. did not differ from the F1 generation in total fruit yields and he proposed that F2 generation seed could be used for commercial planting. Schuster *et al.* (1974) reported that hybrid vigor of *C. pepo* hybridization diminished only slightly in the F2 generation but decreased significantly in the next generation (F3). They suggested that F1 hybrid seed produced by hand pollination could be multiplied by open pollination to produce F2 hybrid seed for commercial sale. Several ornamental flower cultivars are sold as F2 hybrids rather than F1 hybrids to reduce seed cost. For
example, ‘Speckles Mixed’ geranium (*Pelargonium x hortorum* L.H. Bailey), ‘Padparadja’ and ‘Jolly Joker’ pansy (*Viola wittrockiana Gams*), ‘Fuseedia’ Fuchsia hybrida hort. are all sold as F₂ hybrid cultivars (Thompson and Morgan, 2004). Information in fruit quality characters in F₁ hybrid parent and their F₂ generation is lacking in Korean context and therefore, this study was conducted to evaluate the fruit quality characters in F₂ hybrid cultivars of minipaprika and compare them with original F₁ hybrid cultivar and, to recommend some F₂ superior lines for the selection of better quality fruits in F₃ generation.

**MATERIALS AND METHODS**

**Plant material**

Seeds of the F₁ hybrid minipaprika cultivar ‘Vine Sweet’ (Yellow and Orange type) was sown on plug trays in February, 2010. Seedlings were transplanted in March, 2010 and plants were grown under climate-controlled and insect-proof greenhouse in farmer’s field, Hwacheon (Personal observation). The fruits produced in F₁ hybrid cultivar within insect-proof greenhouse were assumed to be self-pollinated and, their seeds were extracted in July, 2010 and bulked to be F₂ seed. The F₂ seed was sown in plastic plug trays (54 cm length and 26 cm width) contained 128 plugs, filled with horticultural soil (Sangtho, Korea). Seedlings were fertilized with slow release fertilizer and irrigation was given twice per day. The F₂ seedlings were transplanted at the Research Farm, Hwacheon in August, 2010. The soil type at this research farm consists of sand dominated coarse with poor water holding capacity (Personal observation). A single line of plants was spaced 50 cm apart and three lines were arranged 30 cm apart in one bed and bed to bed distance was maintained at 1 m. From each yellow and orange minipaprika type, 900 F₂ progenies were transplanted by hand in spade made hole. Plants received the fertilizers and irrigation as required.

**Observation**

After the fruits fully matured and turned into yellow and orange color, 12 individual plants were randomly selected from each row in both types and fruits were harvested. Altogether 50 individual plants from both types were selected and given the name as MPY (Minipaprika Yellow) series and MPO (Minipaprika Orange) series, and fruits from each plant were harvested to analyze the fruit quality characters. Fruit weight (g) per fruit, fruit length (cm) and width (cm) were measured. Pericarp thickness (mm) was measured by vernier caliper and total soluble solid (TSS) was measured using pocket refractometer pal-1 (Atago, Japan). Fruit volume was measured by volume of water displaced by each fruit and fruit lobe was counted after the transverse section cutting of the fruit. Measurement on fruit quality parameters were taken from each individual fruit and averaged. The fruits of original F₁ hybrid minipaprika cultivars (yellow and orange) were harvested from the farmer’s field, and their fruit quality characters compared with F₂ progenies. Descriptive statistics (mean and standard deviation) were used to analyze the data using Microsoft Excel (Version 10).

**RESULTS**

Fruit weight varied among the F₂ population of F₁ cultivar ‘Vine Sweet’ Yellow type (Table 1). It ranged from 12.2 g (MPY-4) to 50.8 g (MPY-16) with an average 28.5 g. Fruit length varied from 4.7 cm (MPY-4) to 10.7 cm (MPY-38) with average value 7.7 cm. Similarly, the average fruit width was 3.9 cm ranging from 2.4 cm (MPY-4) to 4.5 cm (MPY-24). Fruit length/width ratio ranged from 1.4 (MPY-50) to 2.8 (MPY-46) with an average of 2.0. Likewise, flesh thickness varied from 1.8 mm (MPY-50) to 4.1 (MPY-14 and MPY-47) with the average value of 2.9 mm. Total soluble solids (TSS) also varied among the F₂ progeny and it ranged from 6.2°Brix (MPY-15) to 13.5°Brix (MPY-10) with an average 8.7°Brix. Fruit volume average was 24.4 cc ranging from 10.3 (MPY-4) to 46.7 (MPY-14). Most of F₂ progeny had 2 to 3 fruit lobe, except MPY-25 (3-4).

Variation in fruit quality characters in the second generation (F₂) progeny of F₁ cultivar ‘Vine Sweet’ Orange type