Full Length Research Paper

Growth and yield response of hot peppers in the US Virgin Islands

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ABSTRACT

Studies were conducted to assess the response of hot pepper cultivars for yield and quality in the local soil and climatic conditions of the US Virgin Islands. Seven cultivars namely 'Ring of Fire', 'Compadre', 'Camino Real', 'Jalapeno M', 'Caribbean Red', 'Hungarian Yellow Hot Wax', and 'Aguila Real' were tested in the field. Significant differences were observed in cultivars for marketable fruit weight, marketable yield, and number of fruits. 'Hungarian Yellow Wax' was the first cultivar harvested (60 days) and 'Caribbean Red' observed late maturity (80 days) among the seven cultivars tested. 'Compadre' produced the highest total marketable yield (1215.83g/plant). 'Caribbean Red' produced lowest marketable yield (129.53g/plant) in given number of harvests and time. 'Camino Real' produced highest number of marketable fruits (230/plant) and 'Hungarian Yellow Hot Wax' produced lowest number of marketable fruits (37/plant). 'Compadre' fruits were biggest (43.62gm) and 'Ring of Fire' was smallest (5.16gm) in fruit weight. Results of scoville heat unit test (pungency) of fresh peppers showed that 'Caribbean Red' is hottest peppers (24,289 heat units) among all while 'Hungarian Yellow Hot Wax' (581 heat units) was mildest one. No serious pests and disease incidence was recorded during whole growing season. Overall results indicated that all varieties showed good adaptability and were rated as good or excellent in disease tolerance, yield and quality.

Keywords: Capsicum, Production, Caribbean, Marketable yield, Pungency.

INTRODUCTION

Hot pepper (Capsicum chinense L.) is an important cash crop among small-scale growers in the US Virgin Islands and grown for fresh market. The production and acreage planting of peppers have been increased in the U.S Virgin Islands (Census of Agriculture, 2009). Vegetable variety trials is a long term component of the Horticulture Program at the University of the Virgin Islands Agricultural Experiment Station and several varieties of hot peppers have been tested in 80's and 90's (Ramcharan, 1981; Palada et al., 1993). There is continuous need for new variety testing in hot peppers for high yield, production, marketability, insect pests and disease resistance and overall suitability to grow in the U.S. Virgin Islands. Several reports on cultivar trials of hot peppers are available in the literature from the Caribbean region, US and other countries, which includes colored and specialty peppers (Petersen, 1987; Crossman et al., 1999; Joseph and Clair, 1999; Roberts and Paulraj, 2005; McGlashan et al., 2005; Gardner et al., 2007). Hot pepper is an important horticultural crop, not only because of its economic importance, but also due to nutritional and medicinal value of its fruit (Iqbal et al., 2009). It is indigenous to the Caribbean region and cultivation of the hot peppers with distinct flavor, highly aromatic and super hot group (Scoville heat unit) for pungency is profitable (McDonald, 2001). Irrigation, fertilization, pest management and virus diseases are the major field constraints (Roberts and Paulraj, 2005) while aflatoxin contamination during storage is a core issue in hot pepper export (Iqbal et al., 2011). The main objective of present study was to conduct field trials of hot pepper cultivars for growth, adaptability and
yield potential in the U.S. Virgin Islands conditions.

Materials and Methods

Experiments were conducted at the Agricultural Experiment Station-University of the Virgin Islands, Kingshill in fall 2011 to early 2012. Seven cultivars viz. ‘Ring of Fire’ (RF), ‘Compadre’ (CP), ‘Camino Real’ (CL), ‘Jalapeno M’ (JM), ‘Caribbean Red’ (CR), ‘Hungarian Yellow Hot Wax’ (HY), and ‘Aquila Real’ (AR) were selected for the field evaluation. Seeds were procured from Stokes Seeds Co., NY and planted in seedling trays containing 'Pro Mix' potting mix. Seedlings were transplanted in the field approximately 6 weeks after germination. Plots consisted of three rows spaced 4 feet within row, with 12 plants per row spaced 2 feet between the plants within a row in drip system (Figure 1). The experimental design was a randomized complete blocks, with 3 replications. Data collected from ten plants (#2-11) from center row on maturity, plant height, fruit weight, marketable fruits, and yield. Fields were scouted and monitored for insect pests and diseases by Extension entomologist periodically. One application of ‘Malathion’ and ‘Venom’ were used to control insect pests. No preplant fertilizers were applied. A complete fertilizer 20-20-20 was applied during the experiment through drip irrigation system (fertigation) to provide a total of 120 lb. N, 80 lb. P₂O₅ and 80 lb. K₂O per acre (Berkeet et al., 2005). Data were collected on marketable yield, marketable fruit weight, plant height, maturity and biomass (fresh and dry weight) and analyzed. Fresh fruits, leaves and plants were dried in Gravity oven (Blue M Electric Company, TX) keeping overnight at 55°C. Samples of fresh fruits (1 lb in each variety) sent to commercial laboratory (Eurofins Scientific Inc., Des Moines, IA) for pungency analysis. Data collected from eight harvests during the growing season of 2011-2012. Grading of harvested peppers was done according to the United States Department of Agriculture’s Standards (United States Standards for Grades of Peppers, 2007).

RESULTS AND DISCUSSION

Hot peppers were harvested as they reached marketable size (firm and full size) at green colour stage before turning colour from green to red (Figure 2). Marketable fruits were separated from culls and then counted and weighed. Number of culls was recorded as sunscald, small, misshapen, and damaged. Data on marketable yield (US#1), fruit weight and maturity are presented in Table 1.

Significant differences were observed in cultivars for marketable fruit weight, marketable yield, and number of fruits (Table 1). ‘Hungarian Yellow Wax’ was the first cultivar harvested (60 days) and ‘Caribbean Red’ observed late maturity (80 days) among the seven cultivars tested (Figure 3). ‘Compadre’ produced the highest total marketable yield (1215.83 g/plant) while ‘Caribbean Red’ produced lowest marketable yield (129.53 g/plant) in given number of harvests and time. Poor performance of ‘Caribbean Red’ may be attributed by late maturity as no fruits were produced until 4th harvest. First marketable fruits were produced in 5th harvest. ‘Caribbean Red’ plants were still producing fruits after 8th harvest when other cultivars showed decline in production. ‘Camino Real’ produced highest number of marketable fruits (230/plant) and ‘Hungarian Yellow Hot Wax’ produced lowest number of marketable fruits (37/plant). Single fruit weight was highest (43.62 gm.) in ‘Compadre’ and it was on the lower side (5.16 gm) in ‘Ring of Fire’. Higher yield in ‘Compadre’ can be attributed to largefruit size compared to ‘Camino Real’ though highest number of marketable fruits produced in later (Figure 4).

Pungency test of fresh fruits indicated that ‘Caribbean Red’ produced the hottest peppers (24,289 Scoville heat units) and ‘Hungarian Yellow Hot Wax’ was the mildest pepper among all. Pungency level (SHU) of all seven cultivars is presented in Figure 5. Biomass of (fresh and dry weight) of fruits is presented in Figure 6. ‘Compadre’ produced highest biomass among all the cultivars evaluated in present study.

Field evaluations of hot peppers have been reported in the literature. In Grenada, the efforts on the hot pepper development program has resulted in increased hot pepper acreage and yields, reduced production costs, improved produce quality and increased hot pepper exports (Joseph and Clair, 1999). Adams et al. (2001) reported effect of high plant population densities on yield, plant and fruit characterization in ‘West Indian Red’ hot pepper cultivar in Barbados. Field studies on the effect of organic and synthetic mulch on yield of ‘Scotch Bonnet’ hot pepper has been reported (Gardner and Queely, 2001). Palada and O’Keefe (2001) reported response of four cultivars of hot pepper to various soil moisture levels through drip irrigation in the US Virgin Islands. In earlier report, Crossman et al., (1999) evaluated seven hot pepper cultivars various ‘Scotch Bonnet’ and ‘Habanero’ types in the U.S. Virgin Islands. ‘West Indies Hot’ pepper produced the highest number of and fresh weight of fruits per hectare in the AES trial. In present study, ‘Compadre’ was high yielding compared to ‘Caribbean Red’, which could be more productive in longer duration of sustained production.

There have been reports emphasizing the need for research on hot peppers for the development of hot pepper industry. Germplasm development and improvement is priority to supply the varieties that satisfy market demand (McDonald, 2001). All varieties performed well and produced fruits in the USVI soil and climatic conditions. No serious diseases and insect pests observed during the trial; however, Malathion was effective in keeping the common pests, such as...
Figure 1. Experimental plot of hot peppers at UVI-AES

Figure 2. Caribbean Red peppers

Figure 3. Number of marketable fruits in harvests from 1-8
Figure 4. Average marketable fruits/plant

Figure 5. Pungency level (Scoville heat unit) of hot pepper cultivars.

Figure 6. Fresh and dry weight of fruits of hot pepper cultivars.
caterpillars and leaf miners at low level. Results of present study indicated that cultivars evaluated may have production potential to fulfill local market requirements for fresh consumption. 'Caribbean Red' may be suitable for hot pepper sauce industry considering its high pungency level.

ACKNOWLEDGMENTS

This research was conducted under Hatch grant received from USDA-NIFA. Author wishes to thank horticulture program staff Vanessa Forbes, Paulino (Papo) Perez and Victor Almondover for their assistance in the field trials, maintaining, harvesting and data collection.

REFERENCES