Results obtained show that black beans can be grown during the fall or spring season in south Florida. Although no seed yield differences occurred among genotypes in most experiments, 4 row/bed consistently outyielded 2 row bed plants. Further yield evaluations under different environmental conditions are needed. Lodging resistance is an important black bean characteristic for seed production, particularly under the wet and humid growing conditions of Florida. Lodged plants would result in decreased harvestable yields when combined, and increased pod and seed rot when in contact with the soil. 'Arbolito' had the highest lodging resistance in both trials at Fort Pierce. Mexico PI 209465 and 'ICA-Pijao' had the highest lodging resistance in 1977 at Homestead. Adequate pod dryness and low leaf retention during harvesting are needed to facilitate harvesting with combines. Mexico 203924 with low pod dryness and high leaf retention may have considerable seed losses during the combining operation.

In light of all these production problems, seed yields in the fall were comparable to those obtained in New York state. More research in plant population, planting dates, cultural practices, lodging resistance, pest management, and yield quality evaluation is needed to determine the highest economic yields and grower acceptance of black beans in Florida.

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FLORIDA WF75-6 AND WF75-13: NEW BELL PEPPER BREEDING LINES WITH CONCENTRATED FRUIT SET[1]

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Abstract. **Two new bell pepper genotypes were released from the University of Florida for use in breeding programs for early fruit maturity and concentrated fruit set. The lines are derived from a population from 'Yolo Wonder' which apparently was outcrossed with an unknown genotype whose fruit were early maturing and elongated. Plants of 'WF75-6' and 'WF75-13' have a compact habit with heavy foliage. Plants have a multiple branching type of growth, with numerous fruit maturing at one time near the terminal. Plants are as tolerant of bacterial spot as 'Early Calwonder' but are not resistant to the major pepper viruses prevalent in Florida. Fruit are blocky and occasionally elongated. Fruit mature about one week earlier than 'Early Calwonder' and total marketable fruit yields of the two genotypes are greater than 'Early Calwonder.' Plants of 'WF75-6' are shorter than 'WF75-13' and fruit of 'WF75-6' are smaller, firmer, and darker green than either 'WF75-13' or 'Early Calwonder.'**

Production of bell peppers (*Capsicum annuum* L.) in Florida during the 1978-79 season was over 8 million bushels with a total value of $49.4 million (1). Of the 18,100 acres harvested during this period, 65% were in Lee, Collier, Hendry, and Palm Beach counties on Florida's southwest and southeast coasts. The predominant cultivars grown in these areas were 'Early Calwonder' and 'Yolo Wonder,' although several new cultivars have been tested, including 2 virus-resistant cultivars recently released from the University of Florida (2,3). These cultivars have a rangy growth habit with fruit maturing continuously, which requires multiple harvests for maximum yield. Often destruction of the foliage during initial harvests damages immature fruit or causes them to be scalded by the sun. Concentrated fruit set enabling a once-over harvest is a desirable characteristic not available in these commercial cultivars. 'WF75-6' and 'WF75-13' are short, low-branching plants with early maturity and concentrated fruit set.

Origin

'WF75-6' and 'WF75-13' originated as a single plant selection made from a population of 'Yolo Wonder' at the Agricultural Research & Education Center, Bradenton during the Fall 1974 season. The plant was selected because of its abnormal anthers which were shriveled and produced very little pollen, which suggested the possibility of male sterility. The plant was propagated vegetatively and numerous self pollinations were attempted during the Spring 1975 season. A limited number of seed matured, and the resultant seedlings varied in growth habit from rangy to compact; in fruit set from sparse to concentrated; and in tolerance to bacterial spot (*Xanthomonas vesicatoria* (Doidge) Dows.) from low to high. All plants examined produced normal flower parts. Single plant selections were made from the segregating population during the Fall 1975 season, and 2 were designated 'WF75-6' and 'WF75-13.' Plants were evaluated in observational trials for the next four generations and single plant selections were retained from each based upon fruit size, fruit number, concentrated fruit set, pedicle size, and field tolerance to bacterial spot. Plants of these two breeding lines were grown in isolated areas at AREC-Bradenton during the Spring 1978 season and the seed was bulked for use in replicated trials. Plants

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are now in the 8th generation from the original segregating population.

Description

Plants of 'WF75-6' and 'WF75-13' have a compact habit with a heavy cover of large leaves which protects the fruit from sunburn. Plants have a multiple branching type of growth, with a single terminal flower developing at the 6th or 7th node. When the terminal flower is initiated (or soon thereafter), lateral branches with short internodes develop, producing a bushy plant with numerous slightly pendant flowers maturing at one time near the terminal (Fig. 1).

Fig. 1. Plant of 'Florida WF75-6' with leaves removed to show concentrated fruit arrangement.

Plants of 'WF75-6' and 'WF75-13' are 14-16 inches tall in the spring and 12-14 inches tall in the fall, with 'WF76-6' consistently shorter. Fruit generally are blocky but occasionally are elongated. Fruit occasionally are distorted by pressure from adjacent fruit due to the compactness of the lateral branches. The sweet (non-pungent) fruit have 3 or 4 locules with thick ovular walls and concave blossom ends. Both breeding lines are early maturing with fruit ripening to bright red. Fruit of 'WF75-6' are darker *green and firmer* than 'WF75-13.' 'WF75-6' and 'WF75-13' produce marketable fruit about 1 week earlier than 'Early Calwonder.' An interesting feature of the fruit is the slightly enlarged diameter of the pedicle which for both genotypes is 0.1-0.2 inches greater than either 'Early Calwonder' or 'Yolo Wonder.' This characteristic makes the fruit easier to separate from the branches, reducing the possibility of uprooting the whole plant during fruit harvest. Field observations (Dr. J. P. Jones, personal communication) indicate that 'WF75-6' is more tolerant to bacterial spot than 'Early Calwonder,' whereas 'WF75-13' is similar to 'Early Calwonder' in tolerance. Plants and fruit were screened for susceptibility to the major pepper viruses prevalent in Florida (5) by Dr. H. Y. Ozaki and T. A. Zitter (personal communication) and were found not resistant.

Performance

Extensive replicated trials have been conducted with these 2 breeding lines at Bradenton in comparison with the pepper cultivars grown commercially in the area. During the Fall 1978 season the plants were grown on raised beds of Myakka fine sand using the full-bed mulch production practice (4). Plants were grown in a double row on 2.6 ft wide beds with 1.0 ft between plants down the row and 1.3 ft between rows. Beds were spaced on 4.5 ft centers and water was provided by open ditch seep irrigation. Total fruit yield of 'WF75-13' was greater than either 'WF75-6' or 'Early Calwonder,' with no significant difference between the latter 2 (Table 1). The most apparent and potentially beneficial difference was in the number of early fruit harvested. Both breeding lines produced more fruit than 'Early Calwonder' after the first 2 harvests. Fruit of 'Early Calwonder' were slightly larger than 'WF75-6' during the

Table 1. Total fruit yield of pepper cultivars 'Early Calwonder,' 'WF75-6,' and 'WF75-13' at AREC-Bradenton, Fall 1978.

Cultivar	Number of fruit harvested[z]				Total	Mean fruit weight (oz)
	Nov. 8	Nov. 15	Nov. 8+15	Nov. 22		
Early Calwonder	36.8b[y]	14.0b	50.8c	25.5a	76.2b	4.4a
WF75-6	46.8ab	22.2ab	69.0b	13.5b	82.5b	3.8b
WF75-13	54.0a	30.5a	84.5a	21.0ab	105.5a	4.1ab
	Weight of fruit harvested (lb)					Equiv. yield
	Nov. 8	Nov. 15	Nov. 8+15	Nov. 22	Total	bu/a[x]
Early Calwonder	11.2b	3.3b	14.5b	6.6a	21.1b	618b
WF75-6	11.9ab	4.6b	16.5b	3.1b	19.6b	573b
WF75-13	15.0a	7.5a	22.5a	5.1ab	27.5a	805a

[z]Mean of 4 replications of 20 plants each. Plants grown in a double row on 2.6 ft wide beds with 1.0 ft between plants down the row and 1.3 ft between rows. Beds spaced on 4.5 ft centers.
[y]Mean separation within columns by Duncan's multiple range test, 5% level.
[x]Based on 25 pounds of fruit per bushel and 7345 row feet/acre with 14,690 plants/acre.

Table 2. Fruit size of 'Early Calwonder,' 'WF75-6,' and 'WF75-13' for two harvests at AREC-Bradenton, Fall 1978.

Cultivar or seedling	Fruit size (inches)					
	First harvest (11/8)[z]			Second harvest (11/15)[z]		
	Length	Diam.	Ratio D/L	Length	Diam.	Ratio D/L
Early Calwonder	3.5a[y]	3.0a	0.86a	3.2a	2.8a	0.88a
WF75-6	3.2b	2.8a	0.88a	3.2a	2.6b	0.81a
WF75-13	3.4ab	3.0a	0.88a	3.2a	2.8a	0.88a

[z]Mean of 4 replications of the 10 largest fruit harvested from each.
[y]Mean separation by Duncan's multiple range test, 5% level.

Table 3. Marketable fruit yield of 3 commercial pepper cultivars and 'WF75-6' and 'WF75-13' at AREC-Bradenton, Spring 1979.

Cultivar	Number marketable fruit harvested					
	May 25	June 1	May 25 + June 1	June 8	Total	Mean fruit weight (oz)
Delray Bell	32.5d[y]	42.5b	75.0c	32.0a	107.0c	4.7b
Early Calwonder	45.0c	49.2a	94.2b	27.0a	121.2bc	5.2ab
Yolo Wonder	65.0b	50.2ab	115.2a	25.0a	140.2ab	5.4a
WF75-6	80.0a	43.2b	123.2a	17.8a	141.0ab	4.9b
WF75-13	60.5b	63.8a	124.3a	26.5a	153.2a	4.8b
	Weight of marketable fruit harvested (lb)					
	May 25	June 1	May 25 + June 1	June 8	Total	Equiv. yield bu/a[x]
Delray Bell	12.3c	12.1b	24.4c	6.6a	31.0c	610c
Early Calwonder	18.7b	15.2ab	33.9b	6.0a	39.9b	777b
Yolo Wonder	26.9a	15.0ab	41.9a	5.7a	47.6a	924a
WF75-6	28.0a	11.7b	39.7a	3.7a	43.4ab	846ab
WF75-13	21.6b	17.8a	39.4a	6.4a	45.8a	898a

[z]Mean of 4 replications of 15 plants each. Plants grown in single row on 2.6 ft wide beds with 1.0 ft between plants. Beds spaced on 4.5 ft centers.
[y]Mean separation within columns by Duncan's multiple range test, 5% level.
[x]Based on 25 pounds of fruit per bushel and 7345 row feet/acre with 7345 plants/acre.

Table 4. Fruit size and wall thickness of 3 commercial pepper cultivars, 'WF75-6,' and 'WF75-13' at AREC-Bradenton, Spring 1979.

Cultivar or seedling	Fruit size (inches)						Wall thickness (in. x 10^{-2})[y]
	First harvest (5/25)[z]			Second harvest (6/1)[z]			
	Length	Diam.	Ratio L/D	Length	Diam.	Ratio L/D	
Delray Bell	3.5b[x]	3.1ab	0.89ab	3.4a	3.0a	0.88a	2.0b
Early Calwonder	4.1a	3.2ab	0.78c	3.6a	3.1a	0.86a	2.5a
Yolo Wonder	3.5b	3.4a	0.97a	3.4a	3.1a	0.91a	2.4a
WF75-6	3.6b	3.0b	0.83bc	3.4a	3.0a	0.88a	2.5a
WF75-13	3.7ab	3.0b	0.81bc	3.6a	3.0a	0.83a	2.4a

[z]Mean of 4 replications of the 10 largest fruit harvested from each.
[y]Mean of 25 measurements taken on 5 fruit per cultivar or seedling.
[x]Mean separation by Duncan's multiple range test, 5% level.

initial harvest but no difference was recorded in subsequent harvests (Table 2). The diameter to lengt ratios of the 2 lines were similar to 'Early Calwonder.'

Plants were grown in replicated trials during the Spring 1979 season in a single row on raised beds formed as in 1978. Cultural practices were the same as the previous season. Total marketable fruit yields of the 2 breeding lines were greater than either 'Delray Bell' or 'Early Calwonder' and equivalent to 'Yolo Wonder' (Table 3). 'WF76-6' yielded more fruit during the first harvest than 'WF75-13' or any of the commercial lines tested, indicating the earliness of this line. Cumulative yields for the first 2 harvests showed the 2 breeding lines produced more fruit than 'Delray Bell' or 'Early Calwonder' and equivalent to 'Yolo Wonder.' Projected yields of 'WF75-6' and 'WF75-13' based on 7345 plants/acre were 846 and 898 bu/acre, respectively, as compared to 610 and 777 bu/acre for 'Delray Bell' and 'Early Calwonder,' respectively (Table 3). As in the fall evaluation, 'Early Calwonder' produced fruit larger than 'WF75-6' and equivalent to 'WF75-13' at the initial harvest (Table 4). Fruit size among all entrants was similar in the second harvest. Although ovular walls of 'WF75-6' appear firmer than 'WF75-13' or any of the commercial cultivars evaluated, wall thickness was significantly greater only when compared to 'Delray Bell' (Table 4). The importance of these lines is apparent in the production of early maturing fruit with a concentrated set.

Recommendations

'WF75-6' and 'WF75-13' are intended to be used as genetic stock for pepper breeding programs where characteristics of early maturation and concentrated fruit set are desirable. These lines are not resistant to the major viruses prevalent in some areas of Florida and should not be planted in locations where viruses are a problem. Information on availability of 'WF75-6' and 'WF75-13' may be obtained from Florida Foundation Seed Producers, Inc., P. O. Box 309, Greenwood, FL 32443.

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INFLUENCE OF HARVEST DATE AND CULTIVAR ON SEMIMECHANICALLY HARVESTED FRESH MARKET TOMATO YIELDS[1]

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Abstract. **'MH-1', 'Burgis', and 'Hayslip' tomatoes were evaluated for yields using the IFAS semi-mechanical fresh market tomato harvester. Once-over harvesting was performed on separate plots at 85 and 99 days after transplanting. 'Burgis' had a significantly higher total fruit weight than 'MH-1' or 'Hayslip', regardless of harvesting date. 'MH-1' had significantly smaller colored fruit size but a larger colored fruit number than 'Hayslip' or 'Burgis' at both harvesting dates. On a weight basis, both 'Hayslip' and 'Burgis' had a lower percent of fruit in the pink and red-ripe stages of maturity than 'MH-1' at both harvests. The later harvest had a larger percent and weight of colored fruit than the first harvest, although no significant total yield differences occurred between harvest dates. Sand damage detracted from fruit appearance, especially after ripening. Nevertheless, based on fruit color, size, and yield, 'Hayslip' and 'Burgis' appeared better adapted than 'MH-1' for mechanical harvest of fresh market tomatoes.**

Seasonal labor for manual harvesting is becoming a larger cost component for fresh market tomato production in Florida. Energy requirements for mechanical harvesting were reported to be 46 and 58 % less per acre and per pound of tomato, respectively, as compared with manual harvesting (2). Florida's projected share of U. S. winter fresh tomatoes will only increase from 49 to 51% during 1979 to 1985, respectively (6). Therefore, Florida growers may need to convert to mechanical harvesting to remain competitive with domestic and foreign markets.

In past years, growers have directed their interest primarily to mechanical harvesting of mature green tomato fruits. In an attempt to improve the yield and quality of machine harvested tomatoes a modified IFAS semimechanical harvester was designed and tested in Florida (4). A unique feature of this machine is the ability to sort and handle colored fruit separately from mature green fruit on the harvester.

The purpose of this investigation was to evaluate tomato fruit yields of several cultivars at two harvesting dates using the IFAS semimechanical fresh market harvester.

Materials and Methods

'MH-1' and two new jointless Florida tomato releases, 'Burgis' and 'Hayslip', were evaluated for yield characteristics with the IFAS semimechanical fresh market harvester during the fall 1980 at the Agricultural Research Center, Fort Pierce, Florida.

Dolomitic limestone (1 ton/A) (2.24 mt/ha) was preplant incorporated into an Oldsmar fine sand soil. Raised beds were spaced at 7 ft. (2.1 m) centers with 43 ins (109 cm) width. A fertilizer application of 1,400 lbs/A (1,568 kg/ha) 4-16-4 (N, P_2O_5, K_2O) was banded in 43 ins (109 cm) strips and bedded over. An additional application of 2,100 lbs/A (2,352 kg/ha) 8-21-20 (N, P_2O_5, K_2O) was banded under a 10 inch (25 cm) strip of black plastic offset from the center of each bed (3). Seedlings were transplanted 2 feet (61 cm) apart in a single row within the center of each bed on October 8, 1980. Each plot was 50 ft (15.2) in length. Recommended pest control practices were followed.

Plots were harvested either 85 or 99 days after transplanting with the IFAS semimechanical fresh market harvester. All culls were removed and colored and green fruit were separated by an 8 person crew on the harvester. Further separation of colored fruit into red and pink fruit was completed after the harvest operation. Mature green, pink, and red marketable fruit yields were weighed and pink and red fruit counted. Average fruit size was determined by dividing total marketable colored fruit weight by the total number of colored fruit per plot. The experiment was a randomized complete block design with three replications. Data were subjected to analysis of variance. This was performed by the computer program, (SAS) (1).

Results and Discussion

The first harvest date (85 days after transplanting) had significantly more green fruit and less colored fruit than the second harvest (99 days after transplanting) (Tables 1, 2). However, no significant difference for total marketable yields occurred between the two harvest dates. No significant harvest date X cultivar interaction occurred for any measured variable.

'Burgis' had significantly higher total yields than 'Hayslip' or 'MH-1', regardless of harvesting date (Table 1). The higher yields of 'Burgis' resulted from the larger number of colored fruit when compared to 'Hayslip' since the mean color fruit sizes were not significantly different between the two cultivars (Table 3). 'Hayslip' had more

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