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Evaluation of yield performance of muskmelon (*Cucumis melo* N.) varieties under open field conditions in Seychelles

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Abstract

Objective: A field experiment was conducted from May to July, 2005 and 2006 planting seasons at the Vegetable Evaluation and Research Station Farm, Anse Boileau, Seychelles to evaluate the yield performance of five newly introduced muskmelon varieties, 'Jowel F1', 'Caly F1', 'Joker F1', 'Ludo F1' and 'Citrin F1' against the commonly grown variety 'Hales Best' under field conditions.

Methodology and results: The experiment consisted of six treatments laid out in a randomized complete block design with four replications. The results showed that cv. 'Hales Best' matured earliest, but cv. 'Joker F1' had the highest number and size of fruits. Cultivar Joker F1's fruit length, width, weight and yield were significantly (P≤0.05) higher by 34.3, 31.2, 14.7, 72.6 and 54.2 % respectively in 2005; and 34.8, 16.1, 25.2, 64.8 and 47.4 % respectively in 2006, when compared to cv. 'Hales Best'. Varieties 'Jowel F1', 'Caly F1', 'Ludo F1' and 'Citrin F1' produced 30-40% more fruits in 2005 and 2006, than cv. 'Hales Best'.

Actual or potential application of findings: The results showed that variety 'Joker F1' performed best and could therefore be recommended as a potential replacement for the popular variety 'Hales Best' in Seychelles.

Key words: Muskmelon, varietal evaluation, yield, Seychelles

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Introduction

Muskmelon (*Cucumis melo)* is a member of the Cucurbitaceae family, included in the melon group *Cucumis melo* cantalupensis Naud (Maynard *et al*., 2001). These melons belong to the reticulatus or netted group, whose origin is in the hot valleys of Southwest Asia and were cultivated by settlers in the Seychelles in the 1600's (Gastier, 1993). Most muskmelon varieties have a musk smell, thus the name muskmelon. Muskmelon is a profitable vegetable crop in many countries (Pocher, 2000) and it is an excellent source of vitamins A, B and C (Gastier, 1993).

Muskmelon is one of the most widely grown and highest value horticultural crops in Seychelles (Mullins, 2001). Globally, it has a net profit potential of $5000 per acre (Best, 2001). It is a strong niche crop for fruit and

vegetable growers and offers producers the opportunity for rapid diversification and enhanced cash flow in their farm operations (Pocher, 2000). The fruit size and yield of muskmelon is significantly reduced on soils with low level of nitrogen, phosphorus and organic matter (Zakaria, 2000).

In Seychelles, there is an increasing cultivation of muskmelon to meet the demands of urban markets. The commonly grown variety is 'Hales Best', and it is the only variety available currently with an average yield of 4 t/ha (Roddy, 2004). This yield is low compared to that of other varieties grown elsewhere (Schultheis *et al*., 2003). This study was therefore carried out to evaluate the yield performance of five newly introduced muskmelon varieties, to identify a variety with higher yield that could replace the low yielding local variety 'Hales Best'.

Materials and Methods

The experiment was conducted from May to July, in both years 2005 and 2006 planting seasons, under field conditions at the Vegetable Evaluation and Research Station Farm, at Anse Boileau, Seychelles. Five muskmelon varieties 'Jowel F1', 'Caly F1', 'Joker F1', 'Ludo F1' and 'Citrin F1' were evaluated alongside the popular local variety 'Hales Best' for yield performance. Seeds of the five new varieties were obtained from Holland while cv. 'Hales Best' was obtained from the AVRDC (World Vegetable Centre) station in Arusha, Tanzania.

The soil nutrient content was analysed before seedlings were sown in the nursery. The organic matter, nitrogen, phosphorus, potassium, calcium and magnesium and the pH were analysed using the Walkley-Black method, Kjeldahl, flame photometric, oxidation, atomic absorption spectrophotometer and pH meter, respectively.

Seeds were sown in early May in polypots filled with sterilized media that comprised of a mixture of top soil, well-decomposed poultry manure and coconut coir in the ratio 3:2:1. One seed per variety was sown in a hole dug in the middle of the media to a depth of 1 cm in each polypot. Nursery care, e.g. watering and weeding was done as appropriate. The experiment area, which measured 352.8 m^2 on sandy soil, was cleared, ploughed and harrowed before dividing into 24 treatment plots. Each plot measured 7 m^2 and consisted of two rows, in which 5 seedlings were transplanted per row. Transplanting was done two weeks after nursery sowing at a spacing of 160cm x 50cm, giving a total of 10 plants per plot (equivalent to 12,500 plants $ha^{-1)}$. The treatments were laid out in a randomized complete block design with four replications.

Well-decomposed poultry manure was initially applied by broadcast at the rate of 480 g per plot as recommended by Sunassee (2001). The manure was incorporated into the soil and watered immediately, using drip irrigation at the rate of 30L $plot^{-1}$ day^{-1} (Estico, 2000). Fertilizer (Nitrophoska, 12:12:17-NPK) was applied by spot method (Rijpma, 1991) at five days after transplanting and repeated after four weeks at about 13.3 g $plant^{-1}$, so as to supply 250 Kg ha^{-1} N; 250 Kg ha^{-1} P_2O_5; and 250 Kg ha^{-1} K_2O. Weeding was done manually using a hoe as need arose. Harvesting of fruits was done in late July at the full-slip stage (the stage at which the stem separates clearly from the fruit with little or no pulling).

Data taken included number of days from transplant to maturity, number and size of fruits per plot and total yield (t ha^{-1}). Size parameters were fruit length, width and weight. The data were subjected to Analysis of variance (ANOVA) and treatment means separated using the Least Significant Difference (LSD) method (Steel and Torrie, 1980).

Results and Discussion

The average monthly temperature at the trial site ranged from 22.6 - 30.2 ˚C (Table 1), which is optimal for the growth and development of muskmelon (Gastier, 1993). In both years 2005 and 2006, the month of June had the highest average monthly rainfall as well as the highest number of rainy days. The highest average relative humidity was 85.2 and 86.0 % in May of 2005 and 2006, respectively.

The total N value in the soil was low at 0.05 and 0.09 %, in the two experimental years). The soil had a medium level of P (7.1 and 9.2

ppm), a low level of K (0.07 and 0.10 %) for the years 2005 and 2006, respectively. Relatively moderate amounts of exchangeable bases (Ca and Mg) were present in the soil. Organic matter was low (1.4 and 1.6 %) in 2005 and 2006, respectively, while the pH in water was near neutral (Table 2).

Variety 'Hales Best' was the earliest to mature in both years 2005 and 2006, averaging 56.5 and 55.0 days, respectively (Table 3). Variety 'Joker F1' matured late, averaging 69.5 and 68.9 days in 2005 and 2006, respectively. This could be attributed to the genetic response of the varieties to the environment. Variety 'Hales Best' is also considered to be tolerant to high temperature (above 30°C) (Clark *et al.*; 1998) which could have influenced its early germination and maturity.

Table 1: Average rainfall, temperature and relative humidity data at Anse Boileau, Seychelles during the experimental periods of May-July in 2005 and 2006.

Month	Average rainfall (mm)	Average temperature (°C)		Average relative humidity (%)
2005		**Max.**	**Min.**	
May	8.0(23)+	30.2	23.2	86.0
June	15.8(25)	30.2	23.1	85.8
July	4.2(12)	28.0	22.6	83.6
2006				
May	10.2(22)+	29.2	23.2	85.2
June	15.3(24)	28.3	23.1	83.4
July	4.0(11)	28.4	22.8	80.1

Source: Vegetable Evaluation and Research Meteorological Station, Anse Boileau,Seychelles
.+Value in parenthesis indicate number of rainy days

Table 2: Physico-chemical properties of the soil at the experimental site before planting in 2005 and 2006.

Soil physico-chemical properties	Experimental year		Method of analysis
	2005	**2006**	
Organic matter	1.4 %	1.6 %	Walkley-Black method
Nitrogen	0.05 %	0.09 %	Kjeldahl method
P_2O_5	7.1 ppm	9.2 ppm	Flame photometric
K	0.07 %	0.10 %	Oxidation method
Ca	1.89 meq/100 g	2.01 meq/100 g	A.A.S.
Mg	1.00 meq/100 g	1.02 meq/100 g	A.A.S
pH (H_2O)	5.8	6.3	pH meter
pH ($CaCl_2$)	5.0	5.1	pH meter

Type of Soil= Sand; ppm = parts per million; Source: Soil Science Laboratory, Grand Anse, Seychelles.A.A.S.= Atomic Absorption Spectrophotometer.

Variety 'Joker F1' produced the highest number of fruits which was significantly (P≤0.05) increased by 34.3 and 34.8 % in 2005 and 2006 respectively, compared to that obtained from 'Hales Best'. Variety 'Joker F1' which is characterized as finely netted, was observed to produce more flowers compared to the other varieties. The higher number of flowers could be a possible explanation for the high number of fruits obtained. Maynard *et al* (2001) also obtained a high number of fruits from cultivars that produced more flowers.

Fruits of variety 'Joker F1' were longest and widest averaging 17.51 and 15.30 cm long in 2005 and 2006, respectively and 11.96 and 12.62 cm width in 2005 and 2006, respectively. The large fruit sizes could be due to this variety's large cavity in length and width. A correlation between cavity and muskmelon fruit sizes has been reported previously by in Holland (Mullins, 2001).

Variety 'Joker F1' also had the highest fruit weight and yield, averaging 1.86 kg $fruit^{-1}$ and 6.92 t ha^{-1} in 2005, and 1.42 kg $fruit^{-1}$ and

6.50 t ha^{-1} in 2006. Heavy fruits could have been due to the large fleshy thickness characteristic of this variety. In a similar experiment in Malaysia, Zakaria (2000), reported that cultivar 'Joker F1' produced the highest yields on soils with low organic matter compared to other cultivars that are likely to be more sensitive to soil fertility. This could have also accounted for its higher yield in Seychelles soils which have low organic matter. Similar results have been reported for this variety in Mauritius and Brazil (Clark *et al*., 1998; Mullins, 2001). The yield obtained from variety 'Joker F1' was significantly higher (P≤0.05) by 54.2 and 47.4 % in 2005 and 2006, respectively, compared to that of the popular variety 'Hales Best'. The yield of varieties 'Jowel F1', 'Caly F1', 'Ludo F1' and 'Citrin F1' was also significantly higher (P≤0.05) by 30 – 40 % in both years 2005 and 2006, compared to cv. 'Hales Best'.

From the results obtained, it is clear that variety 'Joker F1' performed best and it is therefore recommended as a potential replacement to the low yielding but popular variety 'Hales Best' in Seychelles. This variety yields more fruits, fruit with larger length, width and weight. It is, however, recommended that further investigation on the yield performance of the varieties be carried out at different locations with varying agroecology in the Seychelles.

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Table 3: Yield performance of five muskmelon varieties compared with the local variety 'Hales Best' at Anse Boileau, Seychelles, during the 2005 and 2006 planting seasons.

Number of days to maturity			Mean number of fruits		Mean fruit length (cm)		Mean fruit width (cm)		Mean fruit weight (Kg)		Yield (t/ha	
Variety	**2005**	**2006**	**2005**	**2006**	**2005**	**2006**	**2005**	**2006**	**2005**	**2006**	**2005**	**2006**
Jowel F1	64.5	63.6	9.5	10.0	10.66	9.40	10.24	9.46	0.57	0.62	5.34	5.10
Caly F1	65.3	64.2	11.3	11.7	9.98	10.20	10.35	10.40	0.56	0.60	4.53	5.00
Joker F1	69.5	68.9	14.0	13.2	17.51	15.30	11.96	12.62	1.86	1.42	6.92	6.50
Ludo F1	63.3	63.7	9.3	8.8	13.51	13.25	10.50	9.77	0.80	0.74	5.56	5.20
Citrin F1	67.5	66.3	12.0	11.6	11.15	12.43	11.14	10.32	0.82	0.80	5.25	5.01
Hales Best	56.5	55.0	9.2	8.6	12.04	12.84	10.20	9.44	0.51	0.50	3.17	3.42
Mean	64.4	63.6	8.1	10.7	12.48	12.24	10.73	10.34	0.85	0.78	5.13	5.04
LSD(P=0.05)	1.59	1.27	0.9	1.4	1.12	1.10	0.37	1.20	0.04	0.08	1.34	1.15
CV (%)	1.64	3.24	7.31	9.45	2.14	6.52	2.32	7.64	3.51	4.20	1.53	4.26

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