Proceedings V World Avocado Congress (Actas V Congreso Mundial del Aguacate) 2003. pp. 129-133.

EVALUATION OF NEW 'HASS'-LIKE AVOCADO CULTIVARS IN SOUTH AFRICA

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ABSTRACT

Six new 'Hass'-like cultivars from California ('Harvest', 'Gem', 'Jewel', 'Sir Prize', 'Nobel', '8-22-5') and one South African selection ('Bonus') were evaluated. Topworking started in 1996, and three crops were evaluated up to 2001. Data on fruit maturity, yield, fruit size distribution and fruit quality after simulated shipment were collected. Both, 'Harvest' and 'Gem', out-produced 'Hass', had good fruit quality and were therefore evaluated further in 2002. All the other cultivars either produced low yields, large fruit, did not colour up and / or had a high incidence of physiological disorders, and their evaluation was discontinued after the 2001 season.

In 2002, a fourth crop of cultivars Harvest, Gem and Hass was evaluated. The cumulative yields (1999-2002) were 138, 90 and 88 t/ha for 'Harvest', 'Gem' and 'Hass', respectively. The new 'Hass'-like cultivars Harvest and Gem matured later in the year than 'Hass'. Fruit quality problems were recorded for the first time in 2002 for 'Harvest'. Many 'Harvest' fruit had vascular browning which was probably caused by very low temperatures in the experimental orchard in winter 2002. 'Gem' fruit from the same orchard, however, had good fruit quality as in previous years. Further evaluation of these two cultivars is warranted.

Key Words: avocado, cultivars, 'Hass', yield

INTRODUCTION

On the overseas market, the cultivar Hass is very popular due to its excellent shelf life and eating quality. Fruit with a mass exceeding 160g can usually be exported and best prices were fetched

in the 2002 season for 'Hass' fruit in the mass range 180g to 250g. The major draw backs of this cultivar are the production of a large percentage of undersized fruit and an alternate bearing pattern. The long term aim of this project is to find a new 'Hass'-like cultivar which consistently bears higher yields than 'Hass', and to extend the 'Hass' season. Therefore, the following new 'Hass'-like cultivars were evaluated at Westfalia Estate since 1996: Harvest, Gem, Jewel, Sir Prize, Nobel, 8-22-5 and Bonus.

MATERIALS AND METHODS

The new 'Hass'-like cultivars Harvest, Gem , Jewel, Sir Prize, Nobel and 8-22-5 originated from a Californian breeding program (Witney & Martin, 1995). Bonus was selected at Westfalia Estate, situated in the Limpopo Province of South Africa (latitude 24°S). Top-working started at Westfalia Estate in 1996. Ten trees on Duke 7 rootstock were topworked per cultivar. For comparison, trees were also top-worked with 'Hass'.

Fruit were picked on several dates from mid June to early September, yields were recorded and fruit size distribution was determined by taking fruit samples and weighing fruit individually. Fruit were waxed with Avoshine (Citrashine Pty. Ltd.) and fruit firmness readings were taken with a densimeter (Köhne *et al.*, 1998) before storage and upon removal from cold storage. Fruit were stored for 28 days at 5.5°C to simulate sea shipment to Europe. Thereafter the fruit were ripened at 18°C. Black cold and lenticel damage were evaluated upon removal from cold storage, while skin colour, diseases and physiological disorders were evaluated when the fruit were eat ripe.

RESULTS AND DISCUSSION

'Sir Prize', 'Nobel', '8-22-5', 'Jewel' and 'Hass' matured in June, while 'Harvest', 'Gem' and 'Bonus' matured in July through early September. Yields and the peaks of the fruit size distribution curves are shown in Table 1. Cumulative yields (1999-2001) of cultivars Harvest and Gem were higher than that of 'Hass' by 125% and 20% respectively, while 'Bonus' and 'Jewel' produced very low yields. 'Sir Prize', 'Jewel' and '8-22-5' fruit were found to be too large, while the fruit size distribution curve peaked at the more favourable counts 12-16 for 'Harvest' and at count 16 for 'Hass'. Over the three year period 1999 through 2001, 'Harvest' and 'Gem' had good fruit quality after simulated shipment, while cultivars Jewel and Nobel did not colour up. With regard to physiological disorders, 'Nobel', '8-22-5' and 'Jewel' had a high incidence of grey pulp (Kremer-Köhne, 2000, 2001 and 2002). Due to low yields, large fruit, colour problems and/or the high incidence of physiological disorders, the evaluation of 'Jewel', 'Nobel', '8-22-5', 'Bonus' and 'Sir Prize' was discontinued after the 2001 season.

In 2002, 'Harvest', 'Gem' and 'Hass' were evaluated further. 'Hass' matured in June through August, while 'Harvest' and 'Gem' matured in July through August which confirmed previous results. Yields and the peaks of the fruit size distribution curves are shown in Table 1. The cumulative yield (1999 – 2002) of cultivar Harvest was 57% and 53% higher than that of 'Hass' and 'Gem' respectively. 'Gem' has also been reported to bear high yields in California with less alternate bearing tendencies than some of the other varieties (Arpaia, 2002). Fruit quality after simulated shipment is shown in Table 2. In 2002, fruit quality problems were recorded for the first time for 'Harvest'. Many 'Harvest' fruit had severe vascular browning which was probably caused by very low temperatures in the experimental orchard in winter 2002. 'Gem' fruit from the same orchard, howev-

er, had good fruit quality as in previous years. In addition to the high incidence of vascular browning in 'Harvest', a hard tissue layer around the seed was observed in some fruit.

CONCLUSIONS

The new Hass-like cultivars Harvest and Gem matured later in the year than 'Hass'. 'Harvest' outproduced 'Hass' and 'Gem' by 57% and 53% respectively over the 4-year period 1999-2002. In 2002, however, 'Harvest' was affected by fruit quality problems for the first time while 'Gem' had good fruit quality as in previous years. The potentially inferior fruit quality of 'Harvest' is a major drawback on the excellent yields. Further testing of these two cultivars is warranted and is to be extended to three other South African production regions in 2003.

Acknowledgements

The authors wish to thank the South African Avocado Growers' Association for financial support.

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Table 1.:Yields (t/ha) and peaks of the fruit size distribution curves of new 'Hass'-like cultivars at Westfalia Estate (top-worked 1996) for the years 1999 through 2002.

Cultivar	Yield (t/ha)[1]						Count peak[2]
	1999	2000	2001	Cumulative 1999-2001	2002	Cumulative 1999-2002	
Harvest	29.2	37.0	52.4	118.6	19.3	137.9	12-16
Gem	11.4	28.2	23.8	63.4	27.0	90.4	12-14
Sir Prize	18.8	26.0	11.1	55.9	-[3]		8-12
Hass	2.8	20.0	29.7	52.5	35.4	87.9	16
8-22-5	0	6.6	23.2	29.8	-[3]		8-10
Nobel	6.8	7.8	10.9	25.5	-[3]		14
Bonus	0	10.8	6.4	17.2	-[3]		14-16
Jewel	4.6	5.6	5.9	16.1	-[3]		8-10

[1] extrapolated to 200 trees/ha

[2] based on a 4 kg carton

[3] evaluation discontinued after the 2001 season

Table 2.: Postharvest quality of the new 'Hass'-like cultivars Harvest and Gem, compared with the standard 'Hass' after simulated shipment (28 days at 5.5°C) in 2002. Symptoms are presented as average ratings on a scale of 0 (no symptom) to 3 (severe symptom).

Cultivar	Harvest		Gem		Hass
Date picked	18/07/02	09/08/02	18/07/02	07/08/02	07/08/02
Number of fruit	139	129	140	120	140
Densimeter	n.d.	94.9	n.d.	95.7	93.8
Evaluation upon removal from cold storage					
Densimeter	87.6	85.2	89.6	87.8	83.2
Black cold damage	0	0	0	0	0
Lenticel damage	0.612	0.930	0.657	0.900	0.379
Evaluation when eat ripe					
Skin colour					
Green/black (%)	68	100	42	52	49
Black (%)	32	0	58	48	51
Anthracnose	0	0	0	0	0
Stem end rot	0	0	0	0	0.007
Grey pulp	0	0.008	0	0.033	0
Vascular browning	1.245	0.566	0.271	0.558	0.136
Days to ripening	3.3	3.6	3.4	4.0	4.0

n.d.= not determined