

PERFORMANCE AND MARKET ACCEPTIBILITY OF THE HASS-LIKE CULTIVARS GEM AND HARVEST IN SOUTH AFRICA

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The Hass-like cultivars Gem and Harvest, originating from the avocado varietal breeding program of the University of California, have been evaluated over a number of years at Westfalia Estate in the Limpopo Province of South Africa. The evaluation of these cultivars was extended into three other production regions (early, mid and late season) in South Africa. 'Hass', 'Harvest' and 'Gem' trees were established in 2005 in an early season production region and a first small crop is expected in 2007. 'Hass', 'Harvest' and 'Gem' trees top worked in the mid season production region in 2004, bore a first crop in the 2005/6 season. 'Harvest' out-produced 'Gem' and 'Hass' by 60 and 74 kg/tree respectively. In general, 'Harvest' and 'Gem' fruit (283g – 405g) were bigger than 'Hass' fruit (249g – 340g). In the late season production region, 'Harvest', 'Gem' and 'Hass' trees were top worked in 2005 through 2006 and a first crop can be expected in 2008. As a result of the previous good performance of these cultivars at Westfalia Estate, their commercial potential was evaluated by conducting various taste panels. The cultivars Gem and Harvest were well accepted in a large-scale customer based trial conducted in conjunction with a leading South African food retailer.

Key words: yield, fruit size, quality, maturity, market acceptability

RENDIMIENTO Y ACEPTACIÓN EN EL MERCADO DE LOS CULTIVOS TIPO HASS DE GEM Y HARVEST EN SUDÁFRICA

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Los cultivos tipo Hass de Gem y Harvest, originados desde el programa de cultivo de la variedad de aguacate de la Universidad de California, se han evaluado durante años en el estado de Westfalia en la provincia de Limpopo, Sudáfrica. La evaluación de estos cultivos se extendió a otras tres regiones de producción (principio, mitad y fin de temporada) en Sudáfrica. Los paltos de 'Hass', 'Harvest' y 'Gem' se establecieron en 2005 en una región de producción de principios de temporada y se espera un primer pequeño cultivo en 2007. Los mejores árboles 'Hass', 'Harvest' y 'Gem' tuvieron un mejor rendimiento en la región con producción en la mitad de temporada en 2004, que produjo una

primera cosecha en la temporada 2005/2006. 'Harvest' superó en producción a 'Gem' y 'Hass' por 60 y 74 Kg. árbol⁻¹ respectivamente. En general, la fruta 'Harvest' y 'Gem' (283g – 405g) eran más grandes que la fruta 'Hass' (249 – 340g). En la región con producción a fin de temporada, los árboles de 'Harvest', 'Gem' y 'Hass' funcionaron de mejor manera en 2005 hasta 2006, y se puede esperar una primera cosecha en 2008. Como resultado del buen rendimiento anterior de estos cultivos en el estado de Westfalia, se evaluó su potencial comercial al realizar distintos análisis organolépticos. Los cultivos Gem y Harvest fueron bien aceptados en una prueba a gran escala con clientes, realizada junto con un distribuidor líder de alimentos en Sudáfrica.

Palabras clave: producción, fruta tamaño, la calidad, madurez, aceptación en el mercado

1. Introduction

The cultivar Hass is the dominant avocado cultivar grown in all the avocado producing regions of the world. Under South African conditions, 'Hass' trees produce a large percentage of undersized (<170 g) fruit and tend to be alternate bearing. The occurrence of environmental stresses and *Phytophthora cinnamomi* exacerbates these tendencies. The undersized and thus unmarketable fruit, results in high financial losses for farmers. Avocado cultivar research performed by Westfalia Technological Services (WTS) at Westfalia Estate (Limpopo Province, South Africa) has therefore focused on finding a high yielding, better sized, good quality Hass-like cultivar.

Research commenced in the early 1990's and various selections from Israel, California and South Africa were evaluated (Kremer-Köhne, 1999 & 2001). The cultivars Gem and Harvest, originating from the avocado varietal breeding program of the University of California, have been evaluated over a number of years at Westfalia Estate and have performed well. The cumulative yields of 'Harvest' and 'Gem', after a six year evaluation period, were higher than that of 'Hass' with 'Harvest' out producing 'Hass' and 'Gem'. The Harvest cultivar tends to be alternate bearing, while 'Gem' trees bear consistently (Bruwer and Mokgalabone, 2005). As a result of the good performance of the cultivars, the South African Avocado Growers' Association (SAAGA) negotiated a test agreement with the University of California for the evaluation of these cultivars in three other South African production regions namely the Levubu region in Limpopo Province, the Kiepersol region in Mpumalanga Province and the Howick region in Kwazulu Natal Province (Kremer-Köhne and Mokgalabone, 2004). The cultivars were established in these regions during the period 2004-2006 (Bruwer and Mokgalabone, 2005). The results of the first crop harvested from the Kiepersol region of Mpumalanga province and feedback regarding preliminary trials conducted to evaluate the market acceptability of these cultivars will be discussed.

2. Materials and methods

In the Kiepersol region (Danroc Estate) of Mpumalanga Province, 15 trees each of 'Gem', 'Hass' and 'Harvest' were top worked in 2004 and a first crop was harvested in 2006. Yield data was recorded as kg/tree and extrapolated to ton/ha for 100 trees/ha. The fruit were pooled per cultivar and put over a pack line in order to determine the fruit size distribution (according to a 4kg carton) and pack-out figures according to export, local and factory grades. A sample of each cultivar underwent a simulated shipment period of 28 days at 5.5°C in the WTS experimental cold rooms. Upon removal from cold storage, an evaluation of fruit quality was done as described by Bruwer and Mokgalabone (2005).

A large scale customer based trial was conducted in conjunction with a leading South African food retailer. 'Hass', 'Harvest' and 'Gem' fruit were ripened by the Westfalia Pre-pack unit according to the protocol used for the food retailer. A hundred four-fruit punnets, each containing two 'Hass' fruit, one 'Gem' fruit and one 'Harvest' fruit, were packed. The 'Hass' fruit were labeled 1 and 2, the 'Gem' fruit 3 and the 'Harvest' fruit were labeled 4. The punnets were wrapped in cling wrap and transported to the distribution centre of the food retailer. An independent consultant collected the punnets and distributed it to 100 households consisting of between one and six people. The general appearance of the fruit, ripeness, texture and taste were rated on a scale of one to four (one=unacceptable and four=excellent). The data was collected and the results summarised by the independent consultant in a short report.

3. Results and discussion

A good first crop was harvested in 2006 from the top worked 'Hass' (6 t/ha), 'Gem' (7 t/ha) and 'Harvest' (13 t/ha) trees at Danroc Estate in the Kiepersol region. The fruit were of very good quality, resulting in an export pack-out of 84% for 'Harvest', 85% for 'Hass' and 90% for 'Gem'. The main fruit size of the export grade 'Harvest' and 'Gem' fruit was a count 12, but a large percentage of fruit were in the count 10 and 14 categories. 'Hass' fruit were smaller than 'Harvest' and 'Gem' fruit with most fruit in the count 14 category and some fruit in the count 12 and 16 categories (Figure 1). As this was the first crop from young top worked trees, a decline in the fruit size of all three cultivars can be expected as the trees get older. The post harvest fruit quality after the simulated shipment period of 'Gem' and 'Hass' was good, but some degree of vascular browning was observed in a large percentage of the 'Harvest' fruit (data not shown). Kremer-Köhne and Mokgalabone (2003) reported that severe vascular browning was observed in 'Harvest' fruit during the 2002 season at Westfalia Estate. In California, similar symptoms were observed in 'Harvest' fruit (Arpaia *et al*, 2004). According to Kremer-Köhne and Mokgalabone (2003) this was attributed to low orchard temperatures experienced during the evaluation season.

In the customer based trial, most of the 563 respondents rated the 'Hass' fruit as the best avocado in terms of the attributes evaluated (Table 1). As this trial was conducted at a time when the earlier maturing 'Hass' fruit were more mature and

thus of a better eating quality than the later maturing 'Harvest' and 'Gem' fruit, the result was not unexpected. A similar result was seen when panelists in California rated 'Harvest' as the least liked and 'Hass' as the best liked. The result was again attributed to the maturity differences between the cultivars at the time of the evaluation (Arpaia, 2001).

4. Conclusions

'Harvest' and 'Gem' are superior cultivars in terms of yield when compared to 'Hass'. The yield results obtained from the Kiepersol region confirmed the excellent bearing of 'Harvest' as previously found at Westfalia Estate. Both cultivars are generally bigger than 'Hass' with 'Gem' having the least fruit in the small count range (\leq count 24). 'Gem' fruit also store well at low temperatures with no compromise on fruit quality. The occurrence of vascular browning on 'Harvest' needs to be monitored further.

The customer based trial showed that 'Harvest' and 'Gem' fruit would both be accepted in the market even though 'Hass' was the preferred cultivar. As 'Harvest' and 'Gem' fruit mature later in the season than 'Hass' fruit, a different result could be expected if this trial was repeated when 'Harvest' and 'Gem' fruit were at their optimal maturity.

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5. Literature cited

ARPAIA M. 2001. Avocado post harvest quality. Proceedings of the California Avocado Research Symposium. California. p. 127 – 130.

ARPAIA M., WOOLF A., WHITE A. 2004. Avocado post harvest quality. Proceedings of the California Avocado Research Symposium. California. p. 112 – 125.

BRUWER A.T., MOKGALABONE M.L. 2005. Evaluation of the Hass-like avocado cultivars Harvest, Gem and Grace at Westfalia Technological Services. South African Avocado Growers' Association Yearbook 28. p. 50-51.

KREMER-KÖHNE S. 1999. Evaluation of new Hass-like avocado cultivars at Merensky Technological Services. South African Avocado Growers' Association Yearbook 22. p. 120-122.

KREMER-KÖHNE S. 2001. New Hass-like avocado cultivars at Merensky

Technological Services – further progress in 2000. South African Avocado Growers' Association Yearbook 24. p. 43-44.

KREMER-KÖHNE S., MOKGALABONE M.L. 2003. Progress report on the evaluation of the new Hass-like avocado cultivars Harvest and Gem in 2002. South African Avocado Growers' Association Yearbook 26. p. 41-43.

KREMER-KÖHNE S., MOKGALABONE M.L. 2004. New Hass-like avocado cultivars at Merensky Technological Services: Progress report on the evaluation of Harvest and Gem in 2003. South African Avocado Growers' Association Yearbook 27. p. 25-27.

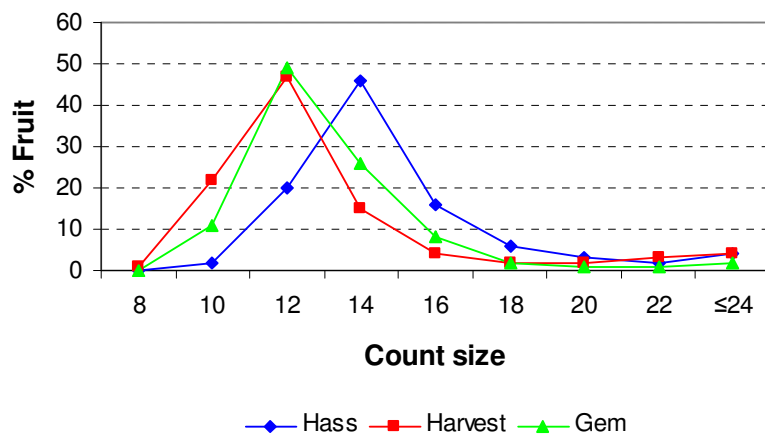


Figure 1. The fruit size distribution curves of export grade 'Hass', 'Harvest' and 'Gem' fruit harvested in the Kiepersol region, Mpumalanga province of South Africa in 2006. The count sizes are based on a 4 kg carton.

Figura 1. El fruto tamaño curvas de distribución de exportación grado 'Hass', 'Harvest' y 'Gem', frutas cosechadas en la Kiepersol región, Mpumalanga provincia de Sudáfrica en 2006. El conteo tamaños se basan en un 4 kg embalaje.

Table 1. The preference of respondents to the different cultivars Hass, Harvest and Gem in a customer based trial conducted with a leading food retailer in South Africa. Results are expressed as an average score where 1=unacceptable and 4=excellent.

Cuadro 1. La preferencia de los encuestados a las diferentes variedades Hass, Harvest y Gem basada en un cliente ensayo realizado con un líder alimentos minorista en Sudáfrica. Resultados están expresadas como una puntuación media donde 1 = inaceptable y 4 = excelente.

Cultivar	General appearance	Ripeness	Texture	Taste	Average score
Hass 1	2.7	3.3	2.8	2.9	2.93
Hass 2	2.6	3.3	2.8	2.7	2.85
Gem	2.4	2.2	2.0	2.2	2.2
Harvest	2.4	2.7	2.2	2.3	2.4