

MALUMA HASS® : A NEW RELEASED CULTIVAR IN COMPARISON WITH HASS

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Maluma Hass® was released with full export cultivar status in South Africa from the breeding and selection programme of Allesbeste Nursery. Two semi commercial trial blocks of 1.5 hectare were respectively planted during March 2001 with Maluma Hass and Hass on clonal Duke 7 with 7 x 3.5 spacing. Maluma is an upright grower with central leader and lateral branching with excellent light penetration while Hass is more compact (several leader branches) with poor lateral branching. Maluma is significantly more precocious and less vigorous than Hass. To induce a higher fruit set as well as to control tree size a growth retardant (uniconazole) needs to be applied on Hass. Without applying growth retardants Maluma outperforms Hass on production, fruit size and distribution. Compared to Hass, Maluma reaches the same moisture levels about one month earlier. The recommended maturity level is 78% (moisture) for Maluma. Maluma has a shiny appearance, colours up (black) very well with no lenticel problems. Maluma exports well and was among others accepted by Tesco (a leading U.K. supermarket) for its ripe-and-ready programmes. In comparison the cumulative production in year five for Maluma was 53 132 kg ha⁻¹ and 36 363 kg ha⁻¹ for Hass (with manipulation). The cumulative income over the same period for Maluma was US\$41 041-61 ha⁻¹ compared to US\$19 213-37 ha⁻¹ for Hass. Allesbeste Nursery holds the plant breeder's rights for Maluma Hass under registration number ZA 20043215

Key words: Allesbeste Nursery, semi commercial trial, precocious, production, earlier, export, plant breeder's rights

HASS MALUMA®: UN NUEVO CULTIVO EN COMPARACIÓN CON LA VARIEDAD HASS

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La variedad Maluma Hass® fue lanzada en Sudáfrica como un cultivo destinado completamente a la exportación, proveniente del programa de reproducción y selección de Allesbeste Nursery. En marzo de 2001 se plantaron dos terrenos semi-comerciales experimentales de 1,5 hectáreas con Maluma Hass y Hass en portainjertos clonales Duke 7, con una distancia de 7 x 3,5. El árbol de la variedad Maluma crece recto con un tronco central y ramificaciones laterales que

permiten una excelente penetración de la luz, mientras que la variedad Hass es más compacta (varias ramas líderes) con pocas ramificaciones laterales. La variedad Maluma es bastante más precoz y menos vigorosa que la Hass. Para inducir un cuajado mayor y controlar el tamaño del árbol se necesita aplicar un retardante del crecimiento (*uniconazole*) en la variedad Hass. Sin aplicar retardantes del crecimiento, la variedad Maluma supera a la variedad Hass en producción, tamaño de sus frutos, y distribución de éstos. Comparados con los frutos de la variedad Hass, los frutos de Maluma alcanzan los mismos niveles internos de humedad con más o menos un mes de anticipación. Para Maluma, el nivel de madurez recomendado es 78% (humedad). La variedad Maluma tiene un aspecto brillante, y se vuelve completamente negra, sin poros levantados. La variedad Maluma se exporta bastante y fue aceptada por Tesco (importante cadena de supermercados en el Reino Unido) para su programa "*Listo para el consumo*". La producción acumulada en el quinto año, da para la variedad Maluma un total de 53.132 kg há⁻¹ y 36.363 kg há⁻¹ para Hass (con manipulación). Las ganancias acumuladas para la misma temporada fueron de US\$ 41.041,61 há⁻¹ para la variedad Maluma, comparada con US\$ 19.213,37 há⁻¹ para la variedad Hass. Allesbeste Nursery tiene los derechos de plantación de Maluma Hass, con número de registro ZA20043215.

Palabras clave: Vivero Allesbeste, semi-comerciales, precoz, producción, antes, exportable, Derecho de Cultivador de plantas

1. Introduction

Hass, a predominantly Guatemalan, but with some Mexican genes, was selected in 1926 by Mr Rudolph Hass at La Glabra Heights, California as a chance seedling of unknown parentage due to its high flesh quality, higher yield and later maturity than Fuerte. Although a patent was granted in 1935 it had taken 15% of the market in 1957 to only surpass Fuerte forty years after its introduction (Bijzet, 2001; Newett *et al*, 2002). In the last 50 years Hass has become the dominant cultivar grown in subtropical climates and in 2000 accounted for 96% of the production in New Zealand, 90% in California and Mexico, 80-85% in Chile, 73% in Spain, 70% in Australia, 31% in South Africa and 27% in Israel (Newett *et al*, 2002).

Maluma Hass[®], also a predominantly Guatemalan, but with some Mexican genes, was selected in the early 1990's by Mr Dries Joubert at Maluma farm, Levubu, Limpopo, South Africa, as a chance seedling of unknown parentage due to its similarity to Hass. Mr Joubert approached Allesbeste Nursery towards the end of the 1990's to evaluate the variety. Plant Breeder's Rights (ZA 20043215) was granted in South Africa with effect from 7 November 2004. The registration of Plant Breeder's Rights for Australia and New Zealand is pending. Maluma Hass has been approved in South Africa as an export cultivar since the end of 2006.

Because of the large differences in tree size, yield is best compared as tonnes per hectare at respective tree spacing (Kadman *et al*, 1976). According to Lahav and Lavi (2002) it is especially important for the majority of the fruit of early

season cultivars to reach commercial maturity at the same time as they have a short life on the tree.

The objective of this study was to draw a comparison between Maluma Hass[®] and Hass.

2. Material and Methods

Maluma Hass[®] material was introduced into the Allesbeste breeding and selection programme during the late 1990's where it was subjected to intensive testing. As part of the testing, two semi commercial trial blocks of 1,5 hectare each were respectively planted during March 2001, with Maluma Hass and Hass on clonal Duke 7 with a 7 x 3,5 spacing (408 plants per ha). The trial blocks were established on the farm, Humor, Tzaneen in the Limpopo Province of South Africa. The co-ordinates of the site are S 23^o 44' 25.0" E 30^o 11' 01.1" at an altitude of 793 metres.

Comparisons have been made with reverence to the tree, flower and fruiting characteristics of the two cultivars.

3. Results and Discussion

According to Table 1 Maluma Hass is Guatemalan in race with some Mexican genes. It has a triangular shaped, thrifty, upright growing tree with a central leader and lateral branching which allows for good light penetration and high production.

TABLE 1 Comparison between the tree characteristics of Maluma Hass and Hass

Characteristics	Maluma Hass	Hass
Plant Breeder's Rights	Yes	No (Expired)
Race	Guatemalan with some Mexican genes	Guatemalan with some Mexican genes
Canopy shape	Upright, triangular	Fairly upright, circular (round)
Canopy structure	Central leader with lateral branching	Several leader branches
Canopy density	Good light penetration	Dense, poor light penetration
Growth vigour	Thrifty	Medium – vigorous
Growth manipulation	Yes, pruning without growth retardant	Yes, pruning with growth retardant
Plant density (Manipulated)	400 – 800 / Ha	200 – 400 / Ha

Precocity	High	Intermediate
Bearing pattern and productivity	Fairly constant and high	Alternative and moderate
Harvest period (export)	Week 12 – 24	Week 18– 33

Maluma Hass has a high precocity, with a fairly constant bearing pattern. From the results of this trail it was evident that plant densities of up to 800 plants per Ha could be considered. In contrast, Hass is a more vigorous grower with several upright growing leader branches with dense lateral branching restricting good light penetration. Hass is less precocious moderate in production with a tendency towards alternative bearing (Bijzet, 2001; Newett *et al*, 2002; Table 1).

TABLE 2 Comparison between the flower and fruit characteristics of Maluma Hass and Hass.

Characteristics	Maluma Hass	Hass
Flower group	A	A
Fruit (orchard) internal cold damage at frost point	Moderate – none	Severe – moderate
Fruit size	150 – 400g	100 – 330g
Fruit shape	Pyriform	Obovate
Fruit colour (ripe)	Purple-black	Reddish-purple
Fruit appearance	Shiny	Dull
Seed shape	Obovate with flat base	Obovate
Seed as % of total fruit volume	10 – 15%	20 – 25%
Skin thickness	1–2 mm	1–2 mm
Skin texture	Semi-rough, pebbly and leathery	Semi-rough, light pebbly and leathery
Lenticel damage	Tolerant	Susceptible
Maturity	≤ 78%	≤ 77%
Taste & Flavour	Excellent, rich and tasty	Excellent, rich and nutty

Flesh colour	Creamy-yellow with light green rind	Creamy-yellow with light green rind
Flesh texture	Smooth and slight fibre	Smooth and slight fibre
Shipping and storage ability	Excellent and acceptable	Excellent and good

Maluma Hass could be harvested for exports at least 4 weeks before Hass. In agreement with Lahav and Lavi (2002) the fruit of the majority of Maluma Hass reaches commercial maturity at the same time. On high densities (400 trees / Ha), to maintain a constant production of reasonable quantity, pruning together with growth retardant sprays are necessary for Hass. No treatment with growth retardants is necessary to ensure a high production with Maluma Hass (Table 1).

Both Maluma Hass and Hass belongs to the A flowering group (Table 2), of which, according to Gazit & Degani (2002) the female part opens in the morning and ends before noon, after which the male part will only open in the afternoon of the next day.

Maluma Hass is not as sensitive to internal fruit orchard cold damage as Hass. Hass has a larger count spread with a tendency towards small fruit. Maluma Hass has pyriform shaped fruit, which is shiny in appearance, and turns purple-black when ripe, whereas Hass has an obovate shaped fruit, dull in appearance and turn reddish purple when ripe. The seed of both cultivars are obovate with that of the Maluma Hass having a flat basis. The seed of the cultivars accounts respectively for 10-15% and 20-25% of the total fruit volume for Maluma Hass and Hass. Both cultivars have a semi-rough, pebbly (light for Hass) and leathery skin, 1-2mm in thickness. Hass fruit is more susceptible to lenticel damage, which could account for export rejections. The fruit maturity moisture level is $\leq 78\%$ for Maluma Hass and $\leq 77\%$ for Hass. The flesh colour of Maluma Hass and Hass is creamy-yellow with a light green rind while the texture is smooth with fibres almost non-existent. Both cultivars have an excellent, rich taste with Hass having a stronger nutty tone. The shipping ability of both cultivars is excellent with Hass having an outstanding shelf life (Table 2). Maluma was, among others, accepted by Tesco (a leading U.K. supermarket) for its ripe-and-ready programmes.

TABLE 3 Comparison between the resistance to fruit diseases and incidence of disorders of Maluma Hass and Hass.

Characteristics	Maluma Hass	Hass
Cercospera	Resistant	Resistant
Anthrachnose	Tolerant	Tolerant
Ring neck	Stress related, small fruit associated – less significant	Stress related, small fruit associated
Physiological disorders	Negligible if managed	Negligible if managed
Insect tolerance	Fairly tolerant	Fairly tolerant

As far as fruit diseases and disorders are concerned both Maluma Hass and Hass are resistant to Cercospora with a fair degree of tolerance to Anthracnose. The presence of ring neck is less significant with Maluma Hass. With both Maluma Hass and Hass, fruit in transshipment could efficiently be managed to prevent physical disorders on arrival overseas. Both cultivars are fairly tolerant to insect damages (Table 3)

The results as presented in Fig. 1 is for Hass, which has been treated with uniconazole (1% at full bloom) compared to that of Maluma Hass, which received no treatment at all. The first significant volume of fruit harvested (year 2) was 2602 kg / ha for Maluma Hass and 467 kg / ha for Hass.

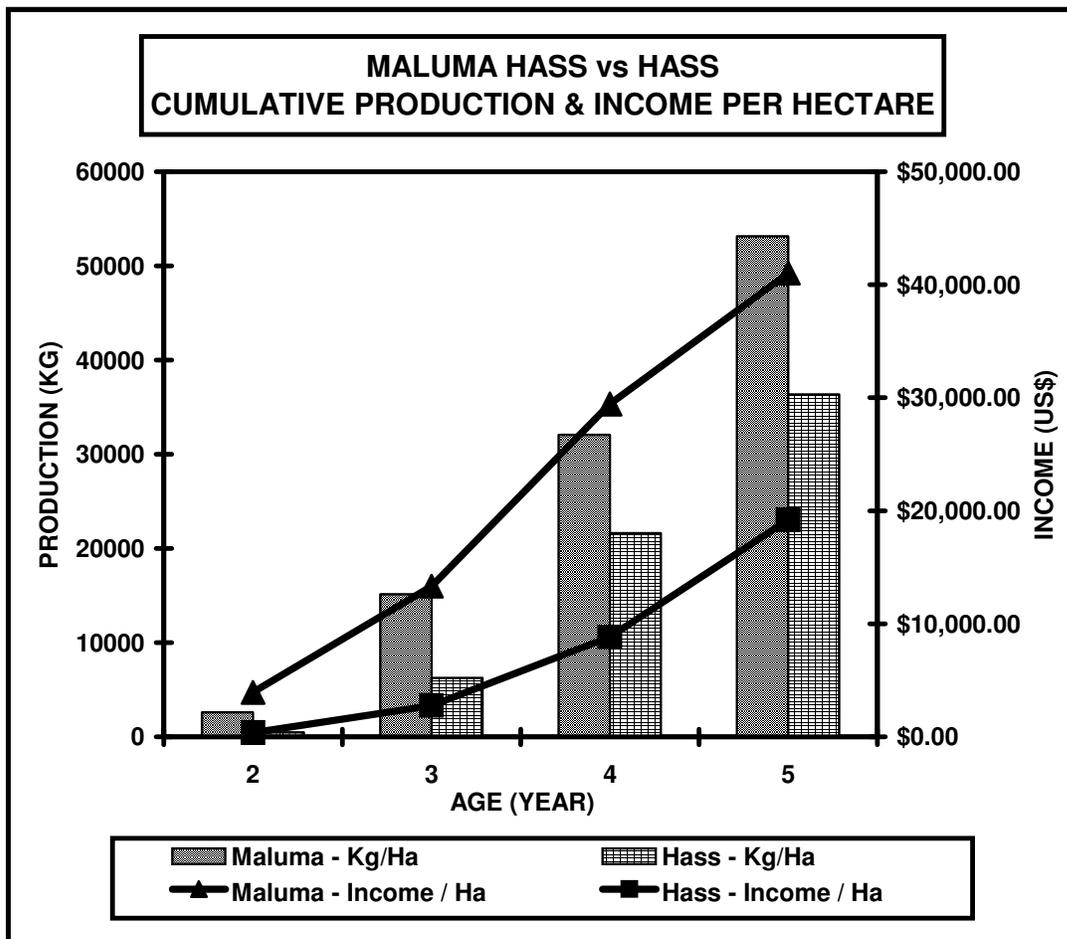


FIG. 1 Five-year cumulative production and income per hectare for Maluma Hass and Hass

In comparison the cumulative production in year five for Maluma Hass was 53 132 kg / ha and 36 363 kg / ha for Hass (with growth manipulation). The cumulative income over the same period for Maluma Hass was US\$41 041-61 / ha compared to US\$19 213-37 / ha for Hass (Fig. 1).

4. Conclusions

Maluma Hass[®], a predominantly Guatemalan, but with some Mexican genes, was selected in the early 1990's by Mr Dries Joubert at Maluma farm, Levubu, Limpopo, South Africa as a chance seedling of unknown parentage, due to its similarity to Hass. Maluma Hass is an early bearing triangular shaped thrifty upright growing tree with a natural central leader and lateral branching, allowing for good light penetration and high productivity. Maluma Hass has a high precocity, with a fairly constant bearing pattern annually. No chemical growth retardant assistance is needed to support production. These characteristics make it possible for Maluma Hass to be considered for high-density plantings.

On fruit appearance, quality and taste Maluma Hass compares very favourable with Hass. It exports well and was, among others, accepted by Tesco (a leading U.K. supermarket) for its ripe-and-ready programmes.

Maluma Hass is either resistant or tolerates the most important fruit diseases and disorders.

Maluma Hass[®] significantly outperforms Hass, on a plant density of 400 trees per hectare, on production and income. Maluma Hass has a better count distribution than Hass. As this is achieved without the use of growth retardants a substantial saving in production cost is evident. Maluma Hass, being an early fruiting cultivar, can successfully extend the Hass season by one month into the early part of the season.

Maluma Hass[®] received full export cultivar status in South Africa towards the end of 2006. Allesbeste Nursery holds the plant breeder's rights for Maluma Hass[®] under registration number ZA 20043215. The registration for plant breeder's rights is pending in New Zealand and Australia.

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