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Quality Tests Identify Best Avocadoes

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Thirteen different varieties of avocadoes grown in south-eastern Queensland were examined for oil content, quality and maturity at the Department's Food Preservation Research Laboratory, Hamilton. The best varieties so far as high oil content and excellence of quality are concerned were found to be Edranol, Fuerte, Hass, Hazzard and Sharwil.

A large number of seedling avocadoes were also examined but most of them were of poor quality. Few compared favourably with the five recognized varieties.

The Queensland avocado industry is small in comparison with crops such as pineapples, apples, bananas and citrus fruits. The total plantings are approximately 125 acres or 12,000 trees, of which roughly 10,000 trees are the Fuerte variety. Nevertheless, aq steadily increasing demand exists for this fruit, particularly on southern markets.

Determination of the correct stage to harvest avocadoes is difficult, since in most varieties there are no visible changes in physical characteristics to indicate maturity. However, American experience has shown that one of the characteristics of the avocado which indicates its maturity from a palatability aspect is its oil content. Resulting from this, maturity standards have been established in the U.S.A., based on the oil content of each variety at minimum acceptable palatability.

No information was available on the variation in oil content in the commercial varieties grown in south-eastern Queensland. These investigations were designed to study these changes over a number of seasons with a view to determining the oil content of each variety at which minimum acceptable palatability occurs.

Oil contents were determined on 13 different avocado varieties in the years 1957-1959 Samples of five fruits were selected at random at regular intervals, generally fortnightly during cropping, fro¼m a number of growers. The fruit were allowed to ripen at air temperatures when palatability was assessed and the remaining pulp macerated for determinations of oil content.

Results of Tests

Anaheim.—This variety is a Guatemalan type ovoid in shape, with a green skin which is rough and of medium thickness. It is the largest variety of avocado grown in Queensland on a commercial scale. Palatable fruit vary in weight from 11¼ to 20½ oz. The size of the seed varied from 9.2 to 21.9 percent, by weight of the whole fruit. The flesh is palatable but "watery" and uninteresting in flavour between oil content of 10 to

15 percent. Even when the oil content exceeds 15 percent, the flavour excites little or no interest. It is common for the Anaheim season to close when the oil content is 17 percent. However, an oil content of 22 percent is attained occasionally if the fruit remains on the tree for an adequate period of time.

The texture of the flesh is rather coarse, and tufts of fibre which darken readily on exposure to air are prevalent at the stylar end of the fruit. The seed also is liable to darken the flesh of the seed cavity and the fruit is very susceptible to disease during post-harvest ripening, particularly if this is of long duration, as in the case of fruit picked at an immature stage. Anaheim is definitely a poor variety of avocado maturing between July and August.

Benik.—Benik is a pear-shaped Guatemalan type having a rough skin of medium thickness. The colour of the skin changes from green to maroon purple during ripening. This variety of avocado is not available in any quantity; consequently maximum and minimum values for weight and oil content were not determined.

The average weight of the mature fruit was approximately 17 oz., and the size of the seed approximately 15 percent, by weight of the whole fruit. The flesh is palatable when the oil content reaches 15 percent. The highest oil content attained in the few fruits available was 24 percent. The flesh is of good texture when eaten at the firm-ripe stage. A tendency of the seed to darken the seed cavity is obviated by eating the fruit before it becomes over-ripe. There is no tendency to disease during post-harvest ripening. Benik has an excellent nutty flavour and quality, but other factors have prevented it from becoming a commercial variety. It matures between July and August.

Edranol.—This is a pear shaped Guatemalan type with a thin leathery skin which is slightly rough and olive green in colour. This variety varies in weight from 10½ to 14½ oz. The seed is small varying from 10.2 to 14.7 percent, by weight of the whole fruit. Although Edranol ripens satisfactorily when the oil content is 12 percent the flesh is still immature, consequently the flavour, although palatable, is uninteresting. The true nutty flavour of Edranol is apparent when the oil content is 15 percent, or more. The highest oil content attained was 28.2 percent. Edranol is almost free from the diseases which attack fruits during post-harvest ripening. The flesh is of good colour and texture and the amount of fibre is negligible. When the fruit is cut, the flesh does not darken and the seed does not stain the seed cavity. Edranol is a fruit which is excellent in every respect. It matures between May and June.

Fuerte.—Fuerte is a hybrid variety exhibiting the characters of both the Mexican and Guatemalan types. The pear-shaped fruit has a thin, leathery skin which is green and slightly pebbled. The weight of the mature Fuerte avocado varies between 8¼ and 15¾ oz. The seed is fairly small, varying from 15.4 to 21.2 percent by weight of the whole fruit.

The nutty flavour and buttery texture of Fuerte does not develop until the oil content attains 15 percent. This variety attained a maximum oil content of 30.2 percent. Flesh texture, colour and flavour are best when the fruit is eaten at the firm-ripe stage. The amount of fibre present is negligible. The post-harvest ripening of mature Fuerte avocadoes is free from the disease and discolouration of the skin and flesh to which some varieties are susceptible. The Fuerte avocado is an excellent fruit and the most

popular variety grown in Australia. It matures between April and May.

Hass.-—This is a pear-shaped to ovoid Guatemalan type, having a thin leathery skin which changes from green to purple black as the fruit ripens. The Hass avocado as marketed varies in weight from 6 to 9¾ oz. The seed is usually small, varying from 13.8 to 18.8 percent by weight of the whole fruit. Occasionally values beyond 18.8 and as high as 25.6 percent have occurred. The flesh is palatable when an oil content of 15 percent, is attained. Hass avocadoes picked late in the season have had oil contents as high as 35 percent. The texture and colour of the flesh are good and the amount of fibre present is negligible. Darkening of the flesh by the seed does not occur and the flesh and skin are almost immune to disease even during fairly long periods of post-harvest ripening. Hass is an excellent variety in every respect. It reaches 15 percent, oil between May and June, but is not normally harvested until much later in the year.

Hazzard.—Hazzard is a pear-shaped Guatemalan type, having a thin and rather rough skin which is green in colour. The weight of this avocado varies from 10 to 14½ oz. Seed size varies from 13.9 to 18.6 percent by weight of the whole fruit. The fruit becomes palatable when the oil content attains 15 percent. Hazzard has a delicious flavour when the oil content is high. In this work, the maximum oil content attained was 34 percent. The texture of the flesh of mature fruit is good and fibre is negligible. The condition of the mature Hazzard fruit, after ripening, is excellent because it is not susceptible to the external and internal diseases and discolourations which occur in some varieties. Hazzard was found to be an avocado of excellent quality. The fruit matures between July and August.

Hellen.—this is a pear-shaped Guatemalan type, having a dark green leathery skin. The fruit is not as large as that of Anaheim, the weight varying between 14¾ and 19¾ oz. The seed varies between 10.5 and 18.4 percent by weight of the whole fruit. Although Hellen is palatable but uninteresting in flavour when the oil content is 10 percent, the ripening period is too long. When the oil content is 15 percent Hellen ripens in 7 to 9 days free from shriveling and diseases of the skin and flesh. The maximum oil content attained was 17.3 percent. Hellen is not susceptible to disease and discolouration of the flesh during post-harvest ripening and the amount of fibre present is negligible. The flavour is nutty after the oil content attains 15 percent. Hellen is a fruit of medium quality, which matures between June and July.

Mac Arthur.—This is a pear-shaped Guatemalan type, having a fairly thin soft skin which is green in colour. The fruit is large, varying in weight from 15¼ to 16¼ oz. The seed varies from 15.5 to 26.2 percent by weight of the whole fruit. The fruit fails to ripen satisfactorily when the oil content is below 13 percent. When the oil content is between 13 and 15 percent, there is considerably less chance of disease intervening during post-harvest ripening. Fruit with an oil content in excess of 15 percent ripens to a sweet nutty but "watery" flavour and is free from shriveling and disease. The maximum oil content attained was 16.7 percent. MacArthur was found to be a poor variety of avocado which matures between August and September.

Nabal.—This is an almost spherical Guatemalan type, having a smooth dark-green skin which is thin and of corky texture. It is a large variety of avocado varying in weight from 15¼ to 19¼ oz. The seed is fairly small and varies from 12.8 to 17.9 percent by weight

of the whole fruit. When the oil content is between 12 and 15 percent the flesh is palatable but uninteresting. Owing to the prolonged period of ripening necessary at this stage of maturity, shriveling of the skin occurs and both the skin and flesh are susceptible to disease and discolouration. At an oil content of 15 percent, or over, the flavour of Nabal becomes nutty and the ripening process more satisfactory although still imperfect. This is often caused by fungi attacking the flesh at the shrivelled stem end. The maximum oil content attained by Nabal was 21.7 percent. There is a medium amount of fibre apparent but this has little effect on palatability. Nabal was found to be a fruit of medium quality which normally matures in the spring.

Rincon.—Rincon is a pear-shaped hybrid variety. The dark-green skin is fairly thin, smooth and leathery. The fruit varies in weight from 8 to 13¼ oz. The seed varies from 15.5 to 22.2 percent by weight of the whole fruit. Ripening is satisfactory and the flavour palatable when an oil content of 15 percent is attained. The maximum oil content which this variety attained was 26.5 percent. The texture of the flesh in mature ripe fruit is buttery. Tufts of fibre which sometimes become black when the fruit is cut are found in the flesh near the seed in the base of the fruit. There is also a tendency of the seed to germinate during the period when the fruit is suitable for consumption. When the skin in the hollow at the base of the fruit begins to assume a corky appearance, the fruit should be harvested immediately because disease of the flesh occurs in this region if harvesting is delayed further. Rincon was found to be a poor variety of avocado. It matures between March and April.

Ryan.—This is a hybrid of the Guatemalan and Mexican types. The fruit is pear-shaped and has a green skin which is moderately thin, leathery and rather rough. This avocado varies in weight from 7½ to 12½ oz. Sometimes the seed is rather large, the variation being from 16.5 to 27.9 percent by weight of the whole fruit. Ryan becomes palatable when the oil content is 15 percent. The maximum oil content attained was 33.2 percent. The flesh of Ryan has a firm texture and a good flavour. The amount of fibre present is negligible. Frequently the large seeds which occur in this variety are only ¼ in. from the skin, consequently the flesh is bruised easily in transit. Such bruises cause disease and a darkening of the flesh at the base of the fruit during post-harvest ripening. The seed also tends to impart its brown colour to the flesh of the seed cavity. A very undesirable feature of Ryan is that the mature fruit sometimes fails to ripen under atmospheric conditions. In such instances, the fruit becomes diseased. Ryan was found to be a fruit of poor quality. It matures between June and July.

Sharwil.—this variety is probably a hybrid of the Mexican and Guatemalan types. The pear shaped fruit has a green skin which is moderately thin and rather rough. The fruit varies in weight from 10¼ to 14¼ oz. Because the seed is small, varying from 8.8 to 15.2 percent by weight of the whole fruit, Sharwil is an economical fruit to purchase. It is palatable when the oil content; attains 15 percent. A maximum oil content of 26.5 percent has been attained. The flesh of Sharwil has a good texture and a negligible amount of fibre. During post-harvest ripening the mature fruit is free from disease and discolouration both internally and externally. Sharwil has a rich nutty flavour and is excellent in every respect. It matures between May and June.

Zutano.—Zutano is a pear-shaped Mexican type, having a very thin, leathery light-green skin. The fruit varies in weight from 10½ to 11¾ oz. The seed varies from 19 to

23.8 percent by weight of the whole fruit. The flesh is palatable when an oil content of 15 percent is attained. A maximum oil content of 22 percent was attained. The texture of the flesh tends to be watery particularly during the early stages of maturity. During post-harvest ripening of mature fruit, the flesh and skin are attacked readily by disease. This applies particularly to fruit which has been handled carelessly during transit. Any immature fruit which reach the market inadvertently are certain to become diseased during ripening. Zutano is a variety of poor quality which matures between April and May.

Seedling Avocadoes.—These vary in size from large to small. Generally the size of the seed is too large for the fruit to be economical. It is common for the seed to be 30 percent by weight of the whole fruit. The maximum and minimum sizes of seeds found in the seedlings examined were 38 percent and 11 percent, respectively. Many seedlings are unpalatable and very few have an excellent flavour. The oil content varies from as low as 4.3 percent to as high as 27 percent. In the majority of seedling avocadoes grown in Queensland the skin is very thin and the flesh watery in flavour. Such fruits are very susceptible to bruising during transit, with the result that disease and blackening of the skin and flesh readily render the fruit unfit for consumption. Many seedling avocadoes have more fibre than recognised varieties and the colour and texture of the flesh is usually poor. Most seedling avocadoes are of extremely poor quality compared with the recognised varieties grown in Queensland.