

Changes to Dabai Fruit during Maturation Process

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Dabai, locally known as Sibu olive, is only found naturally in Sarawak. Its scientific name is *Canarium odontophyllum* Miq. It is one of the popular indigenous fruit that is commonly planted in dusun plots by all the major communities throughout the State. The Research Division of the Department of Agriculture Sarawak has accorded priority on dabai research since 2006 in view of its good potential for development as a specialty fruit of Sarawak. Furthermore, there is prevailing world-wide interest to develop under-utilised fruit crops for food and health conferring properties. The aim of the research work on dabai is to provide technical support to stakeholders of the dabai supply chain and useful information to the general public.

The development of dabai fruit on the fruit bunch consists of three stages namely immature, semi-mature and mature fruit which is accompanied by colour changes from white to reddish-black-white and purplish-black respectively.



Immature dabai fruit



Semi-mature dabai fruit



Mature dabai fruit

There is a lack of documented information on development period for the different stages and changes in mature dabai fruit on the tree. Growers have different opinions on the length of time the mature fruit may 'hold' or left on the tree to reduce oversupply situation during peak harvest season. The latter usually resulted in a sharp drop in market prices and fruit were left not harvested if prices did not recover to a level worthy of the effort. To better understand the physical and nutritional changes to fruit during the maturation process on the tree, preliminary studies on these aspects were conducted on a 14 years old tree No.115 (clone Tarat) at the Agriculture Research Centre (ARC), Semongok during the 2009/2010 fruit season.

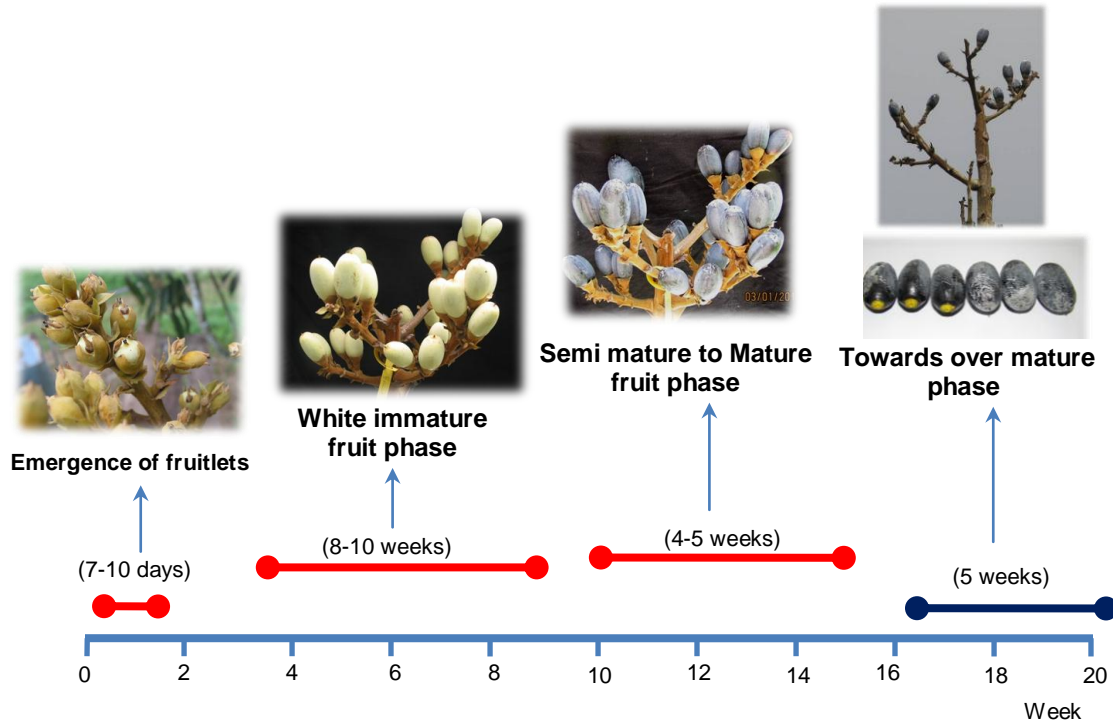
From field observations, flower initiation on Tree No. 115 commenced in late July till early August. From late August, the flowers started to open progressively and anthesis

(period during which the flowers are fully open and functional) of the inflorescence was completed by early September.

About 7 to 10 days after anthesis, fruitlets started to emerge and became noticeable. These white fruitlets were fairly uniform in size and they attained size of 1.6 cm cross-section (i.e. 80% of mature fruit size) a fortnight later. They continued to grow in size for a further 8 weeks and still remained completely white in colour.

The immature fruit entered into semi-ripe stage when their colour began to change to pinkish-red and then to black from the proximal end to distal end of the fruit. This fruit colour change appeared to progress from fruit at the centre of fruit bunch to the end of panicles. At this stage of fruit development, all three maturity stages could be found on the fruit bunches. By a further 4 to 5 weeks, all fruit on the fruit bunch matured into black purplish colour.

Timeline Chart of Dabai Fruit during Maturation Process



Anthesis

The mature fruit could remain on the tree for up to 5 weeks with satisfactory fruit quality. Whitish gummy exudates started to appear at the distal end of the fruit surface which tended to lower the fruit cosmetic appearance. As the fruit went into overripe stage, the skin began to wrinkle with crack lines, exudates on them became more prominent and they also started to drop off. At this stage, the flesh hardened in patches and tended to stick to the seed after they were ‘cooked’ in warm water.

Results from analysis of immature, semi-mature and mature fruit from a bunch showed an increase in fat content at 15.8 %, 24.6 % and 27.6 % respectively. Conversely, there was a decrease in both the protein content at 10.8 %, 9.8 % and 9.2 % respectively and fibre content at 22.1 %, 17.9 % and 14.6 % respectively. There was not much change in the carbohydrate content which was 43.7 %, 40.9 % and 42.5 % respectively. The fruit moisture content decreased from immature to mature stage by 11%.

The nutritional components of mature dabai fruit retained on the tree over a 10-week period showed the fat content increased from 27.6 % to 37.0 % in the first four weeks and dropped to 23.0 % six more weeks later. The carbohydrate content, however, declined from 42.5 % to 38.2 % and then increased to 56.4 % respectively. Both the protein and fibre contents decreased during the said period at 9.2 % to 8.0 % and 14.6 % to 6.4 % respectively.

In summary, the study ascertained that dabai fruit matures after about 4 months from anthesis. The white immature fruit phase is about 9-11 weeks and it takes another 4-5 weeks for it to progress from semi-mature to mature stages. The mature fruit can be retained on the tree for up to 5 weeks and their quality remains satisfactory. However, as they become over-ripe, their physical appearance deteriorates and they fail to 'cook' properly rendering them unmarketable.

The analysis of nutritional components showed that fat, carbohydrate, protein and fibre contents of mature fruit changes while they are retained on the tree for two months. Based on these results, the recommended harvest time is about 2 weeks after full maturity when the fat and protein contents are at favourable levels in addition to their optimal physical appearance. The outcome from these studies may contribute towards the basis in establishing a protocol for fruit harvesting and grading system for the local dabai industry.