Fruit Growth and Development of Peach (*Prunus persica* L. (Batsch)) *CVS. Flordared and Ang Khang White.*

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ABSTRACT

Fruit growth and development of Flordared and Ang Khang White peaches conducted at Ang Khang Station from December 1979 to June 1980. It was shown that fruit growth and developmental period of Ang Khang White peach (local variety) took longer time than Flordared (the introduced variety). Flordared peach flowered later but the fruits could be harvested 45 days earlier than Ang Khang White peach. Pit hardening stage began when the fruits were about 2 months old in Flordared peach while in Ang Khung White this pit hardening stage was found in the fruits 3 months after full bloom. The periods involved during pit hardening stage were 26 days in Flordared and 64 days in Ang Khang White. A double sigmoidal growth curve was found in both fruit diameter and fruit fresh weight, but the increase in fruit dry weight appeared to follow a single sigmoidal pattern. Flesh of the fruit, endocarp and seed appeared to compete for assimilates throughout fruit development. The fresh weight of endocarp and seed was rapidly increased in the first stage until the pit hardening stage after that growth rate of endocarp and seed was very slow while the rate of fruit flesh rose rapidly till harvest.

INTRODUCTION

Peach is one of the temperate fruits that can be grown in the hill area of northern Thailand, many low chilling peach varieties had been introduced and tested for their adaptability. A few of these introduced varieties had been tested and selected for extending to hilltribes. The varieties such as Flordared, Flordasun, Flordabelle and Ying Ku are said to be of superior in quality to the local peach varieties like Ang Khang Red and Ang Khang White. In general fruit development takes about 120 days, however, from observation the pattern of development varied among varieties, for example the times of flowering were slightly different among varieties but their harvests seemed to be widely apart. At presents, no information of fruit development under the nothern conditions had been reported. This study was designed as a preliminary investigation on fruit developments of the introduced

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variety (Flordared) and of the tocal variety (Ang Khang White), so that this would serve as a basic information on improvement of peach varieties in Thailand.

MATERIALS AND METHODS

Flordared and Ang Khang White peaches grown at Ang Khang Station were used in this study. About 500 flowers in each variety were marked at their full bloom. One month after full bloom, three hundred fruits of similar size in each variety were tagged. The tagged fruits were collected at two weeks interval till harvest, in each collection 20 fruits from each variety were sampled for analysis. The analyses included fruit size, fruit fresh weight, dry weight, stone fresh weight, seed fresh and dry weight.

This study was conducted at the Ang Khang Station and at the Horticulture Department, Kasetsart University during in the period from January 1980 to June 1980.

RESULTS

The developmental stages of fruits from full bloom till harvest are shown in Table 1.

Table 1 Developmental stages of two peach varieties.

	Flordared	Ang Khang White
1. Date of fullbloom	3 Jan. 1980	25 Dec. 1979
2. Harvest date	7 May 1980	16 June 1980
3. Time taken from full bloom to harvesting (days)	120	175
4. Period that fruits stop growing	4 Mar.-30 Mar.	17 Mar.–26 May
5. Time elapsed during pit hardening (days)	26	64
6. Endocarp hardening period	27 Feb.–4 Mar.	17 Mar.–24 Mar.
7. Time involved during the hardening phase (days)	6	8

From adove, it can be seen that Flordared peach took shorter time for fruit development and shorter period of pit hardening compared with those of Ang Khang White. In both varieties the endocarp started to reach the hardening stage at about the same time as the fruits stopped growing.

Fruit growth recorded by measuring its diameter showed the pattern to follow the double sigmoid curve. This was seen in both varieties (Fig 4). Flordared peach started blooming in early January and the fruit growth rate was so rapid at the early stage (in the 30 day period after full bloom), while the

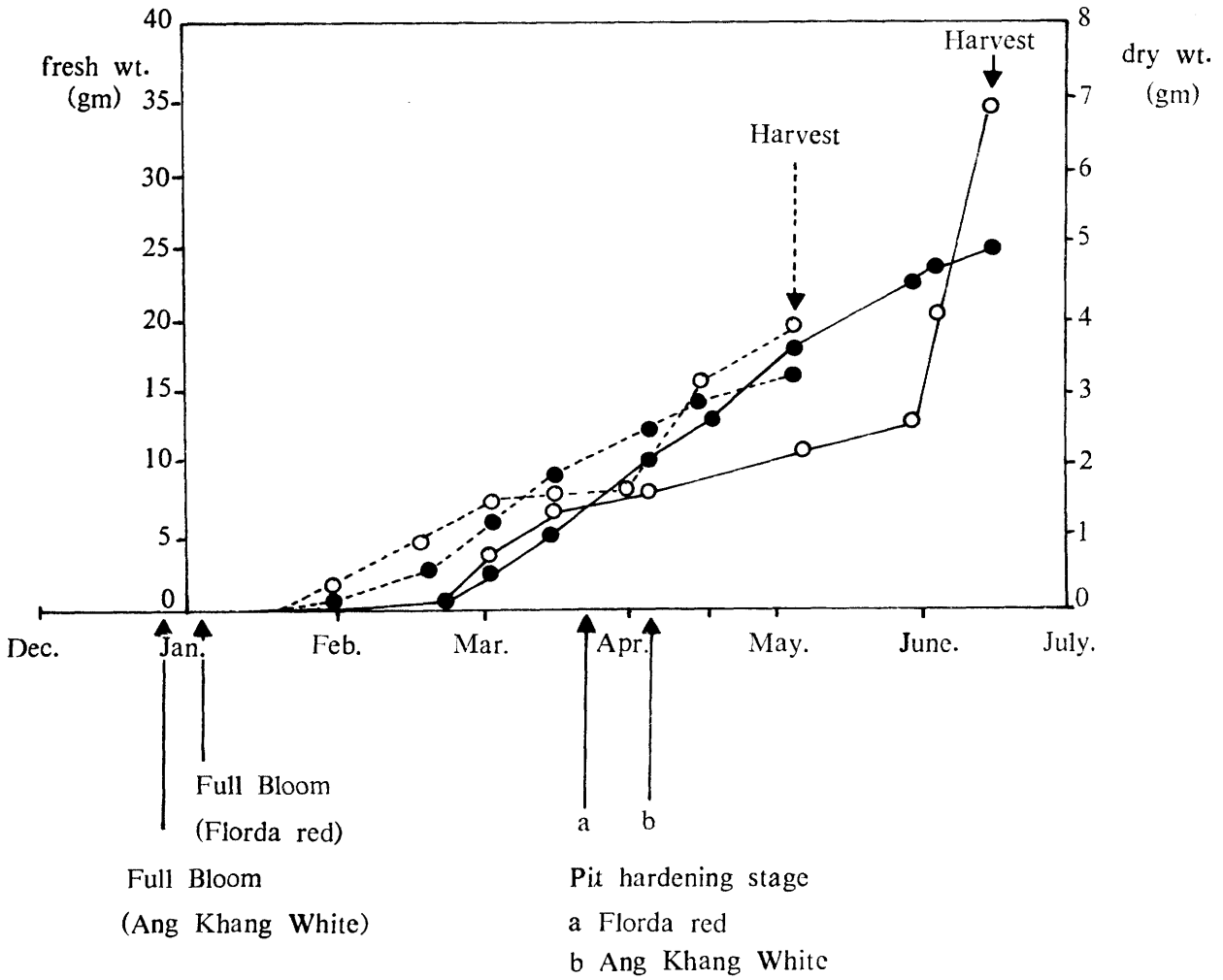

Fig. 1 Developmental stage of Florda red (- - - -) and Ang Khang White (——) peaches. ●——● shows dry weight and ○——○ represents fresh weight data.

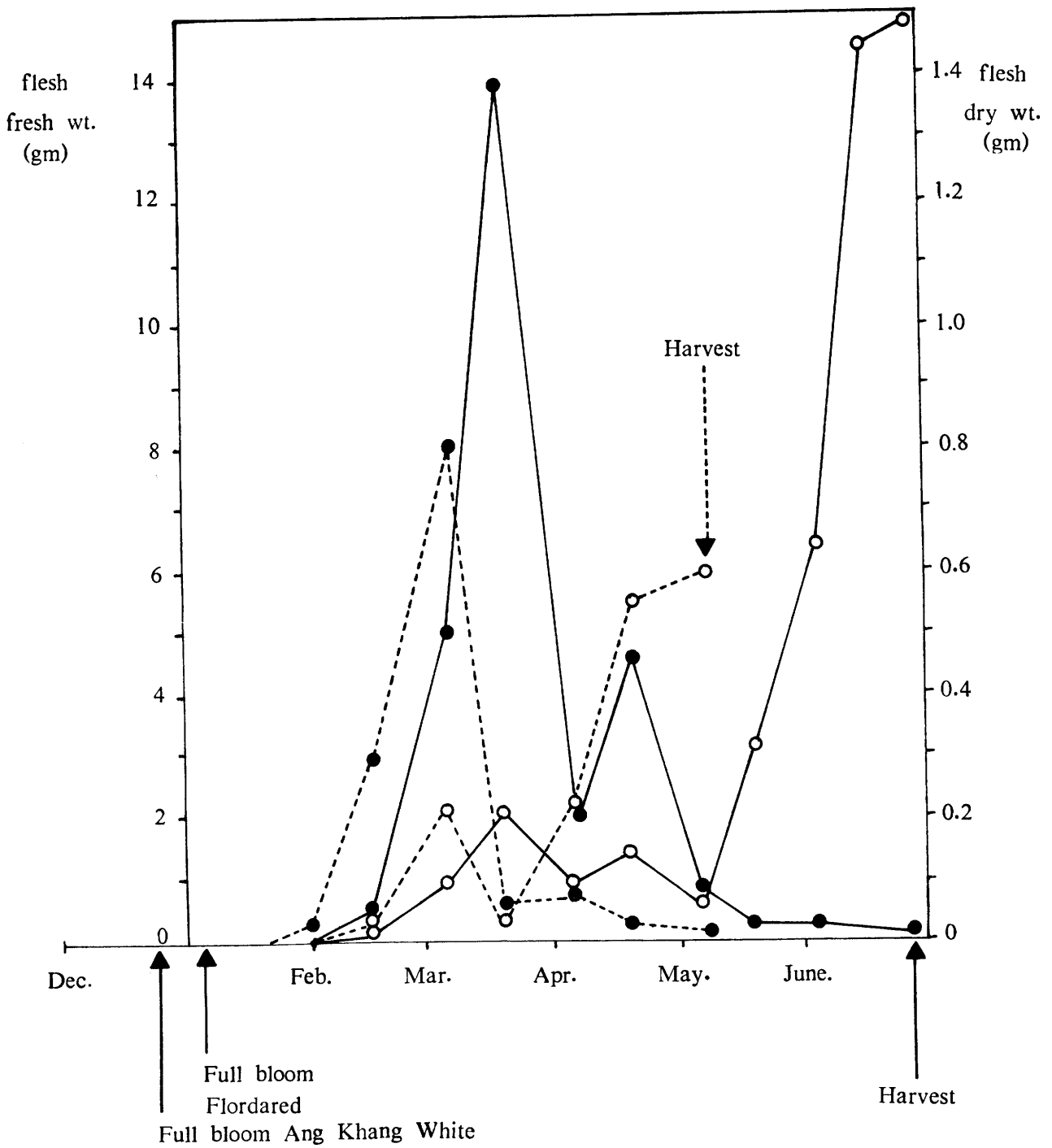

Fig. 2 Development of flesh (○- - - -○) and stone (●----●) of Flordared (——) and Ang Khang White (- - - -) peaches.

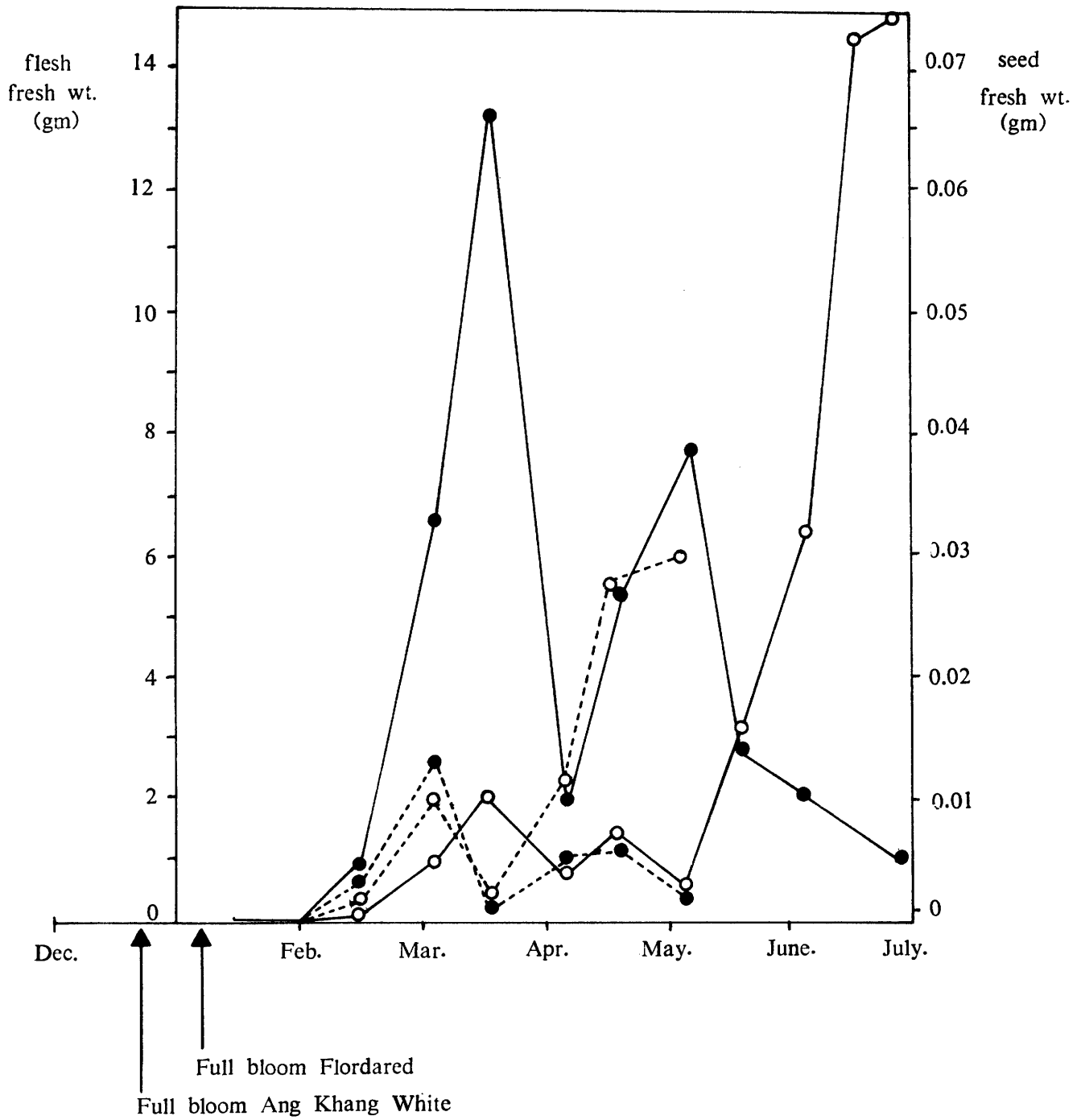

Fig. 3 Relationship between flesh fresh weight (○- - - -○) and seed fresh weight (●- - - -●) of Flordared (——) and Ang Khang White (- - - -) peaches.

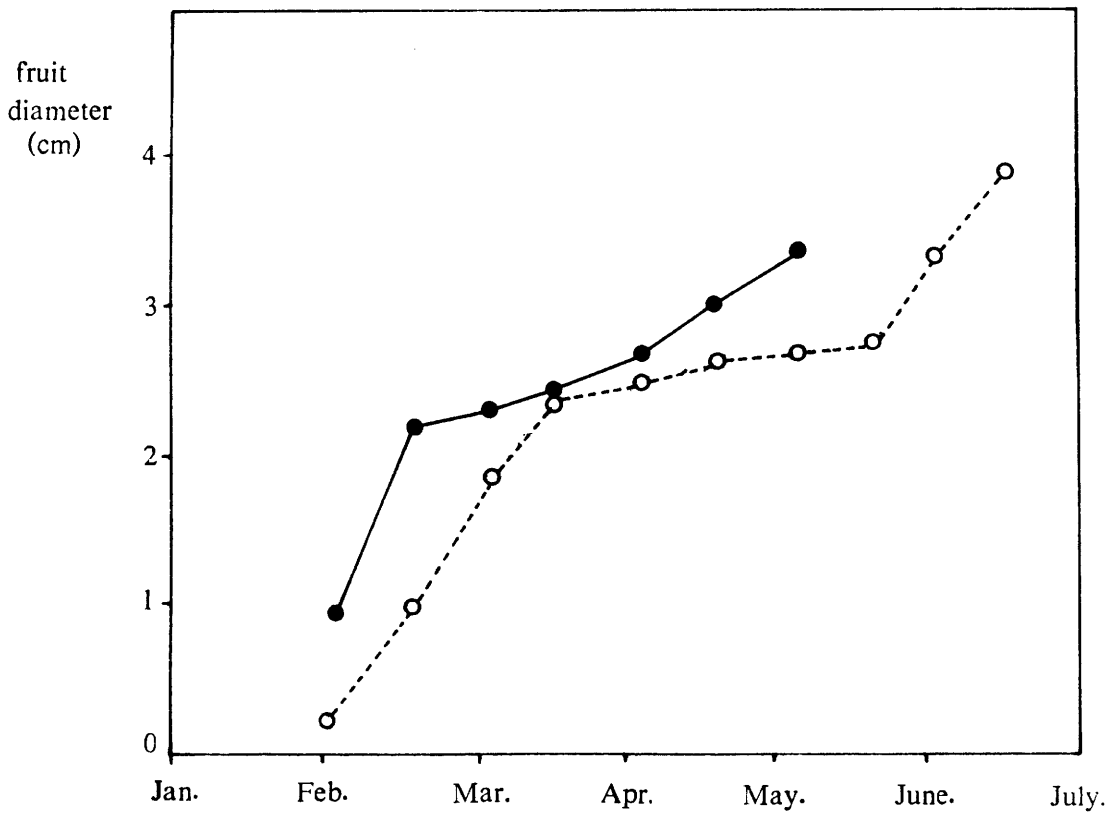

Fig. 4 Fruit growth of Ang Khang White (○----○) and Florda red (●——●) peaches.

rate of fruit growth in Ang Khang White was slower during the initial growth phase and the time taken for fruit development was also longer than that of Flordared.

In both varieties the increase in fruit fresh weight followed the double sigmoid curve (Fig 1). Ang Khang White peach reached the full bloom stage at about the third week of December. Fruit growth rate was so fast after setting and this fast rate continued until the second week of March (about 80 days after full bloom), then the growth rate stopped for about 64 days, before it resumed again in early June (about 150 days after full bloom). This second growth phase took about 20 days before the fruits could be harvested. Compared to Ang Khang White, the Flordared peach took shorter time in almost every developmental phase, for example, the fruit growth rate stopped at about 60 days after full bloom and this 'non-growth phase' took only 26 days before the second growth phase which started in early April (about 90 days after full bloom) and this later growth phase took about 30 days before harvesting (Table 1, Fig. 1).

As the fresh weight followed the double sigmoid pattern, the fruit dry weight, however, was recorded as single sigmoidal curve (Fig. 1).

The relationship between fruit fresh weight and the stone fresh weight was observed. In Ang Khang White it was noticed that the time of rapid fruit growth coincided with the slow rate of stone growth and after the rate of fruit growth decreased the increase in growth rate of stone and seed was found (Fig. 2, 3). The similar pattern was also seen in Flordared variety, only shorter time in all developmental phases compared to that of Ang Khang White peach (Fig. 2, 3).

DISCUSSION

Peach, one of stone fruits, has its fruit growth pattern as a double-sigmoid curve (Nitsch, 1953). In this study, the growth rate of fresh weight and fruit diameter followed the double-sigmoidal pattern, but this was not so in fruit dry weight in both varieties (Fig. 1) which was opposed to those of Chalmers and Van Den Ende (1975) which reported that the growth of both fresh and dry weight of fruits followed the double-sigmoid curve. This difference may be due to the difference in growing conditions, such as soil moisture especially at the beginning of the rainy season which coincides with the period of fruit gowth. During this period, the increase in fruit dry weight may occur due to the increase in endocarp and embryo while the increase in fresh weight was so small.

There may be internal competition in flesh weight and endocarp especially during the development of stone and seed, after that the growth of flesh weight may have its turn (Fig. 2, 3).

In both varieties, the fruits had a period of ceasing growth, at that time there appeared to be a development in endocarp. The stoppage of fruit growth in this period may result from the 'signal' sent from seeds (Chalmers and Van Den

Ende, 1977). The varietal differences in pit hardening period may be due to the difference in their response to this 'signal' which could be a hormone produced in the seed (Crane, 1969; Coombe and Hale, 1973).

CONCLUSION

The study on fruit growth and development of Flordared and Ang Khang White peaches grown at Ang Khang Station can be summarized as follows:-

1. Flordared took shorter time for fruit growth and development compared with Ang Khang White. This resulted in early harvest in Flordared even though the Flordared tree bloomed 10 days later than Ang Khang White.

2. Pit hardening stage began at 60 days after full bloom in Flordared, while in Ang Khang White, this took 80 days.

3. The pit hardening period in Flordared was about 1 month while the same period took 2 months in Ang Khang White.

4. The growth of fruit fresh weight of both varieties followed a double sigmoid curve while that of fruit dry weight appeard to follow a single sigmoid curve.

5. Fruit growth expressed as an increase in diameter followed a double sigmoid pattern.

6. In the early phase of fruit growth, pericarp, stone and seed would compete in growth. Growth rate of stone and seed rose until the pit hardening stage after that the growth rate decreased with an increase in pericarp growth rate.

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