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SOUTHERN FOREST EXPERIMENT STATION

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MATURATION OF BLACK CHERRY FRUITS IN CENTRAL MISSISSIPPI

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SOUTHERN FOREST EXPERIMENT STATION

*Black cherry (*Prunus serotina *Ehrh.) in central Mississippi grew in size and weight from early May until maturity in late June. In early June, crude fat, protein-nitrogen, and calcium concentrations increased; moisture content decreased; endocarps hardened; and embryo tissues became firm. From mid-June to maturity mesocarp growth was prominent as moisture content increased again, carbohydrates were converted from insoluble to soluble forms, and crude fat and protein-nitrogen concentrations decreased.*

Additional keywords: *Prunus serotina* Ehrh., chemical analysis, germination.

INTRODUCTION

Black cherry (*Prunus serotina* Ehrh.), a valuable hardwood species, occurs from Canada to the Gulf of Mexico (Hough 1965). It flowers from March to early June, and fruits mature from June to October, depending on latitude (Sargent 1965). The small, white, perfect flowers are in 10- to 15-cm long racemes, and fruits are single-seeded drupes. The number of cleaned seeds averages 10,500 per kg (Hough 1965).

This paper examines changes that occur in gross physical and chemical characteristics of black cherry fruits as they mature. The study was conducted in central Mississippi where black cherry usually flowers in early April, fruits mature in late June, and the number of cleaned seeds per kg averages 16,500. The species does not reach its highest value in Mississippi, but the data should help seed collectors elsewhere to secure high quality seeds at the proper time.

METHODS

Four trees were selected near Starkville, Mississippi, in 1971. Starting in late April, 10 fruits were collected from each tree every 2 weeks until late July. In 1972 and 1973 similar collections were made from three of the same trees and from a fourth tree that was not included in the earlier year.

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The fruits were collected early in the morning and transported to the laboratory in polyethylene bags for measurements of diameter, fresh weight, dry weight, and moisture contents. Dry weights were obtained after 24 hours of drying in an oven at 105°C. Moisture contents were calculated as percentages of fresh weights.

Beginning in June of 1971 and 1972, extra fruits were collected from the trees for germination tests. These fruits were depulped by hand and stratified for 90 days at 3°C before being placed on moist blotters of Kimpak under diurnally alternating temperatures of 20° and 30°C (I.S.T.A. 1966).

In 1973 extra fruits were collected from one of the trees for chemical analyses. The fruits were dried for 24 hours at 70°C and then ground in a Wiley mill to pass a 20-mesh screen. The material was analyzed for crude fat, soluble and insoluble carbohydrates, soluble nitrogen, protein-nitrogen, phosphorus, calcium, and magnesium. Details of the analytical methods are in Bonner 1972 and 1974.

RESULTS AND DISCUSSION

Physical Characteristics

The fruit crop was excellent in 1971 and poor in 1972 and 1973. In 1971 average weights increased more than five-fold from May 3 until maturity (fig. 1). Fruits from the 1972 and 1973 crops averaged half the weight, both fresh and dry, of the 1971 fruits. The average diameter was 10 mm in 1971, 8 mm in 1972, and 7 mm in 1973. In 1971, diameters were stable until early June, then almost doubled by July when dispersal began.

During each year, moisture content was about 80 percent in early May, then decreased to a low of 65 percent in early June as endocarps became hard, and the embryos changed from a watery pulp to firm, white tissues (fig. 1). After early June, the mesocarps became succulent, and moisture content increased until it ranged from 70 to 75 percent.

A low percentage of seeds germinated, especially in 1972, probably because the alternating 20° and 30°C temperatures prescribed by I.S.T.A. (1966) rules are too high for *P. serotina* (table 1). Farmer and Barnett (1972) got good germination with alternating 10° and 15.6°C temperatures, and we have been successful with a 15° and 25°C regime. Suszka (1967) and Huntzinger (1968) recommend warm-cold stratification, but recent tests in our laboratory show this does not aid germination of Mississippi seeds.

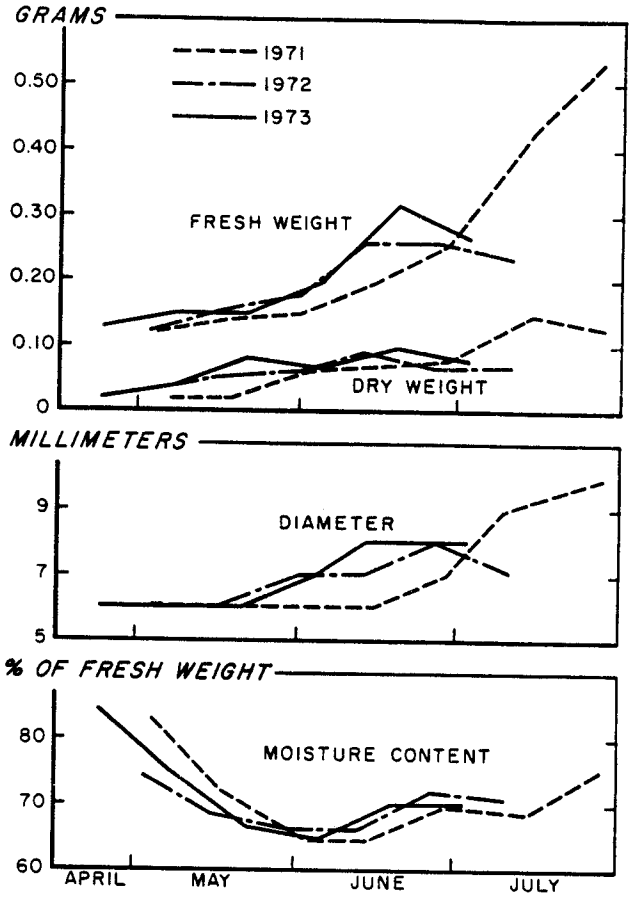

Figure 1.—*Seasonal changes in fresh weight, dry weight, diameter, and moisture content of black cherry fruits.*

Table 1.—*Germination after 30 days of black cherry seeds from 1971 and 1972 collections*

Collection date	Sample tree 1	2	3	4
	Percent			
1971				
June 14	0	15	0	2
June 28	43	23	30	8
July 14	25	6	11	3
July 28	48	9	8	4
1972				
June 6	3	0	7	0
June 26	20	...	3	0

Maturity, the capability of a seed to germinate normally, was best indicated by fruit color. Huntzinger (1968) reported that seeds from green fruits could germinate, but very few did in this study. Most fruits changed from green to light

red by the end of May and from light to dark red in early June. Seeds picked in early June that germinated probably were individuals that matured early. In late June, some exocarps were dark purple, but most were reddish purple, and there was variation in color among fruits from the same tree and within single fruit clusters. A higher percentage of seeds collected in late June germinated than seeds collected at other times, which suggests that this was when most reached physiological maturity.

Chemical Characteristics

The concentration of crude fat and protein-nitrogen decreased slightly in early May, then increased sharply to a maximum on June 5 (fig. 2). A slow decline followed the June 5 peak. Soluble nitrogen decreased from 13 mg per g of fruit on April 23 to a low of 0.6 mg per g on June 18 and then increased slightly.

Insoluble carbohydrates increased from 90 mg per g of fruit in over 150 mg per g on May 21 (fig. 2). After May 21 the concentration of soluble carbohydrates increased sharply to over 250 mg per g of fruit on June 18, which indicates that insoluble carbohydrates were converted to soluble forms. At the final collection on July 2, soluble carbohydrate concentration had fallen, and the insoluble carbohydrate concentration had increased again.

Dry weights of fruit increased from April to July, and although phosphorus and magnesium concentrations decreased, the actual amounts of the elements remained about the same (fig. 2). Calcium levels followed a pattern similar to crude fat and protein-nitrogen.

Carbohydrates were the most important stored foods (20.8 percent of dry weight); protein totaled only 7.8 percent and crude fat only 4.9 percent.

Comparing the chemical contents of depulped mature *P. serotina* with the contents of whole fruits shows that the mesocarp contains much of the crude fat, carbohydrate, and calcium (table 2). Protein appears to be concentrated in the endocarp and embryo. Percents of phosphorus and magnesium differed little between intact and depulped fruits.

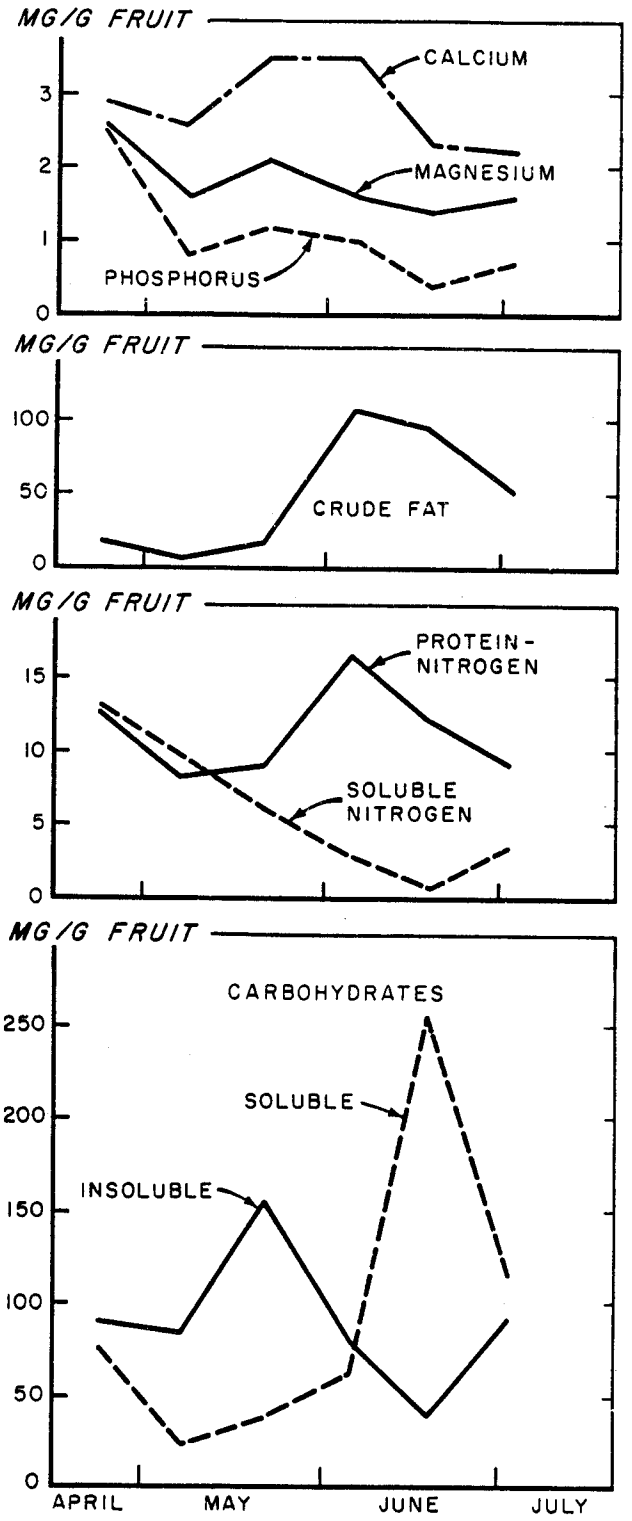

Figure 2.—*Seasonal changes in phosphorus, calcium and magnesium; crude fat; soluble nitrogen and protein-nitrogen; and soluble and insoluble carbohydrates in black cherry fruits.*

Table 2.—*Chemical contents of intact and depulped fruits (Data for depulped fruits taken from Bonner 1971)*

Condition	Crude fat	Total protein	Total carbo-hydrates	P	Ca	Mg
	Percent					
Intact	4.9	7.8	20.8	0.16	0.22	0.07
Depulped	1.8	13.7	15.3	.14	.14	.09

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