

Research Article

SEASONAL TRENDS IN NITROGEN AND CARBOHYDRATE CONTENTS OF 'BANATI' POMEGRANATE FRUITS

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ABSTRACT

Seasonal trends in nitrogen and carbohydrate contents of 'Banati' pomegranate Fruits. The seasonal trends in nitrogen and carbohydrate contents in the Fruits of 'Banati' pomegranate were studied during two successive growing seasons. The nitrogen content expressed as percentage and as mg per Fruit decreased gradually during the growing-season in both years. The percentage total sugars in the Fruits fluctuated during the growing-season, but did not show a consistent trend in the 2 years. The starch content of the Fruits tended to decrease from May till August and then increased till the end of the season in both years.

Keywords: Banati-pomegranate Fruits, Nitrogen and carbohydrate contents.

INTRODUCTION

The pomegranate, *Punica granatum* L., was cultivated in Malagaon, Maharashtra. Very little is known regarding the nitrogen and carbohydrate contents in the Fruits of pomegranate trees. Thus, the aim of the present study was to investigate the seasonal trends of nitrogen (N) and carbohydrates (total sugars and starch) in the Fruits of pomegranate variety 'Banati'. Pomegranate is the Fruits of *Punica granatum* L. (Punicaceae) which is widely grown in Mediterranean countries, and has been introduced to most parts of the tropics and subtropics. The Seeds are the edible part of the fruit which are normally consumed fresh¹. One of the main features of its quality is the red colour of its Seeds and Therefore, production of pomegranate Fruits in 'ready-to-eat' form would be a convenient and desirable alternative to the consumption of fresh fruits and may increase pomegranate demand by consumers.

MATERIALS AND METHODS

The present study was carried out during the growing-seasons of 2006 and 2007 at the Malagaon, Maharashtra. Four uniform 14-year old pomegranate trees of the 'Banati' cultivar grown in a heavy loam soil were selected. In May of each year 100 shoots were tagged on the outer circumference of each tree². Fruit samples were taken from these tagged shoots at monthly intervals from May till November. Each sample consisted of 60 Fruits, of which 30 were used for N determination and 30 for carbohydrate determinations.

For N determination, Fruit samples were dried at 70°C to a constant weight, 248 ground and then analyzed by the micro-Kjeldahl Gunning method. For carbohydrate determinations, the Fruit samples were chopped and killed in 95% boiling ethyl alcohol³. The extraction of sugars was made by 80% ethyl⁴. The total sugars were

determined by the micro method of Shaffer and Somogyi (2005)⁵. The starch was determined in 0.1 g of the residue by hydrolysis with hydrochloric acid on a water bath at 95°C for 3 h⁶. The reducing power was determined by Shaffer and Somogyi's micro method and then the starch was calculated.

RESULTS AND DISCUSSION

Fruit nitrogen - The data showed clearly that the % N (dry weight basis) in the Fruits of 'Banati' pomegranate decreased gradually during the growing- season in both years (Table I). This decrease might be due to the translocation of N to the growing fruits and other parts of the tree. Similar results were found by Rogers and Batjer (2007) in 'Delicious' apple Fruits and Batjer and Westwood (2000) in 'Elberta' peach Fruits⁷.

On the mg N per Fruit basis, the data also revealed that the amount of N in the Fruit declined gradually till the end of the growing-season in both years (Table I).

Total sugars - In the first season, the % total sugars in the Fruits increased from May to June and then decreased till September. Thereafter, a high build up in the total sugars in the Fruits occurred at the end of the season (Table II). In the second season, the % total sugars in the Fruits increased gradually from May till September and then declined till the last period of the growing-season (Table II). Smith et al. (2004) found that total sugars in 'Valencia' orange⁸.

Fruits fluctuated in amount from month to month, but showed the greatest decrease during the period of spring bloom and vegetative growth flush.

Starch - The data presented in Table II show that the starch content was much higher than the total sugars content in the Fruits throughout the growing- season in both years.



Table I: Seasonal trends in nitrogen content of 'Banati' pomegranate Fruits in 2006 and 2007

Sampling months	2006		2007	
	%	mg per Fruit	%	mg per Fruit
May	2.57	1.48	2.46	1.62
June	2.04	1.38	1.94	1.60
July	1.90	1.30	1.85	1.25
August	1.79	1.34	1.69	1.17
September	1.64	1.09	1.51	1.00
October	1.66	0.93	1.38	0.82
November	1.30	0.95	1.24	0.84
L.S.D.	0.05	0.11	0.16	0.18
	0.01	0.15	0.20	0.24

Table II: Seasonal trends in total sugars and starch contents of 'Banati' pomegranate Fruits in 2006 and 2007

Sampling months	2006		2007	
	Total sugars (%)	Starch (%)	Total sugars (%)	Starch (%)
May	1.48	12.33	1.28	9.87
June	2.49	8.17	1.30	7.67
July	1.62	8.10	1.65	6.75
August	1.67	6.81	1.83	6.43
September	1.48	8.23	2.35	7.40
October	2.28	8.07	1.88	8.62
November	1.98	12.62	1.80	11.61
L.S.D.	0.05	0.55	0.54	3.81
	0.01	0.74	0.73	5.32

CONCLUSION

Starch was the most important carbohydrate reserve in the pomegranate Fruits. Concerning the seasonal trends in the starch content of the Fruits, it was noticed that there was a gradual decrease from May till August followed by a gradual increase till November in both years.⁹

The decrease in the Fruit-starch content during the first period of the growing-season might be due to the transformation and subsequent utilization of the stored starch by the growing fruits, while the increase in the Fruit-starch content during the last period of the growing-season could be due to the accumulation of starch in the Fruits after fruit harvest at August in both years. These findings are in general agreement with those reported by Ryugo and Davis (2004)¹⁰ on peach and Jones et al. (1995) on 'Valencia' orange¹¹.

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