



**Research Paper**

**SEASONAL CHANGES IN GLUCOSE CONTENT IN HONEY STOMACH OF  
*Apis mellifera***

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**Abstract**

Pollen and nectar are the two principal food sources of honey bees. The larval stages as well as the adults are fed on different combinations of these two foods. Adult worker bees perform a variety of tasks. A good carbohydrate source is therefore required to meet the energy requirements of the adults. Nectar is the chief source of sugars which the forager honey bees collect from flowers and carry in their honey stomach to the hive. In the hive it is mixed with other contents and modified to meet the specific requirements of all bees. Nectar varies in its glucose concentration depending upon the source, season and changes it undergoes in the honey stomach. The present study was designed to understand these variations.

Key words: honey stomach, glucose, *Apis mellifera*, nectar.

**INTRODUCTION**

For the expansion of the hive honey bees require highly nutritious food and need a lot of energy [4] In honey bees the level of nutrition is closely associated with brood-adult interaction and trophallactic contacts. Trophallaxis means channeling of food from one adult individual to other adult individual [3]. Colony members are fully dependent on stored food. Honey bees have therefore divided their functions so that some take care of brood while others perform foraging activity for carbohydrate and protein supply [3] (Crailsheim, 1990, 2004). Nectar is a natural source of carbohydrates stored by honey bee in their honey stomach [8] (Nicolson and Human, 2008). Sugar is the main component present in nectar [1],[2]. Glucose, fructose and sucrose are the main component of the sugar present in nectar in different proportions [5]. In present studies concentration of glucose in honey stomach of *Apis mellifera* was determined in different seasons.

**MATERIAL AND METHODS**

**Sample collection**

Forager honey bee samples (*Apis mellifera*) were collected in different seasons from an apiary maintained in village Dhannas, Chandigarh.

### Preparation of Samples

Adult honey bees were dissected. The crop region was carefully cut off from the alimentary canal in 1N saline. The sample was homogenized in 1 N saline and homogenate was used for the further experiment.

Estimation of Glucose concentration was done by Glucose kit Protocol.

### RESULT AND DISCUSSION:

Concentration of glucose in honey stomach of *Apis mellifera* in spring, summer, autumn and winter was determined and the results obtained are presented in Table 1 and Fig. 1. It was observed that the concentration of glucose in honey stomach of *Apis mellifera* varied in spring, summer, autumn and winter seasons. In spring the concentration was  $115.22 \pm 0.89$  mg/ml which was significantly more than glucose level in summer ( $68.66 \pm 1.31$  mg/ml), autumn ( $104.65 \pm 1.07$  mg/ml) and winter ( $90.90 \pm 0.91$  mg/ml) as shown in Table 1 and Fig 1.

Table 1: Concentration of glucose in honey stomach of *Apis mellifera* in different seasons.

Seasons	Conc. of glucose mg/ml $\pm$ S.D.
spring	$115.22 \pm 0.89$
summer	$68.66 \pm 1.31$
autumn	$104.65 \pm 1.07$
winter	$90.90 \pm 0.91$

The summer season glucose level ( $68.66 \pm 1.31$  mg/ml) was significantly lower as compared to autumn and winter glucose levels (Table 1 and Fig. 1). Further, in autumn season the concentration of glucose in honey stomach of *Apis mellifera* was  $104.65 \pm 1.07$  mg/ml which was statistically significantly more as compared to winter ( $90.90 \pm 0.91$  mg/ml) season.

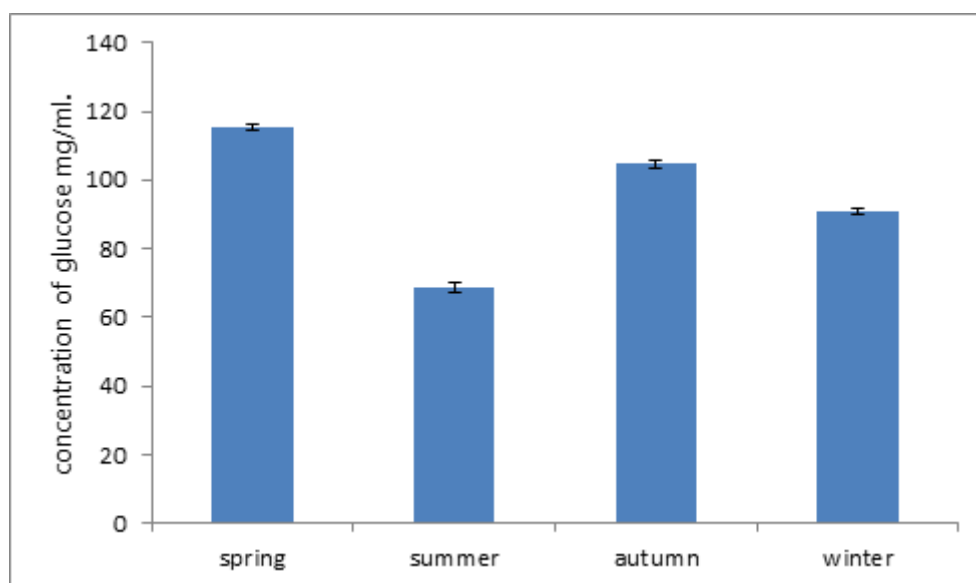


Fig. 1. Histogram showing concentration of glucose in honey stomach of *Apis mellifera* in different seasons.

Perusal of the data revealed that glucose concentration was more in spring and autumn seasons which were also the ideal seasons for beekeeping and honey flow as rich flora

was available in the environment. Climatic conditions and quality of food present in surrounding environment played an important role in determining the growth and health of the honey bee colony [10] [9]. Biochemical make up of honey bee haemolymph and also semen was influenced by the seasons [6] [7].

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#### REFERENCE

1. Baker H.G. 1977. Non-sugar chemical constituents of nectar. *Apidologie*, 8: 349-356.
2. Baker H.G. & Baker, I. 1973. Some anthecological aspects of the evolution of nectar producing flowers, particularly amino acid production in nectar. In: Heywood, V.H. (Ed.) *Taxonomy and ecology*. Academic Press, London, UK
3. Crailsheim K. 1990. The protein balance of the honey bee worker. *Apidologie*, 21: 417-429.
4. DeGroot A.P. 1953. Protein and amino acid requirement of the honey bee (*Apis mellifera* L). *Physiol. Comp. ecol.*, 3:197-285.
5. Freeman C.E., Worthington R.D. and Corral R.D. 1985. Some floral nectar-sugar compositions from Durango and Sinaloa, Mexico. *Biotropica*, 17: 309-313.
6. Kumar. R.N. and Negi. L. (2007). Protein profile of haemolymph from *Apis* species. *J. Bombay Nat. Hist. Soc.*, 104(3).
7. Kumar R. N. and Kaur N. (2003). Seasonal influences on physiochemical characteristics of honey bee semen. *J. App. Zool. Res.*, 14(2).
8. Nicolson, S.W. and Human, H. (2008). Bee get a head start on honey production. *Biology Letters*, 4:299-301.
9. Thuiller W., Lavorel S., Araujo M.B., Skyes M.T. and Prentice I.C. 2005. Climate change threats to plant diversity in Europe. *Proc. Natl Acad. Sci. USA*, 102(23):8245-8250.
10. Winston M.L. 1987. *The biology of the honey bee*. Harvard University Press, Cambridge, Massachusetts.