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# Maneuvering of plant resources among beetles (Coleoptera: Curculionidae: Bruchidae)

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**ABSTRACT**
Adequate utilization of food resources by resorting to temporal and spatial partitioning has been observed in 13 field species belonging to Families Curculionidae and Bruchidae. The species are *Curculio c-album* (Fabricius), *Curculio ficusi* Pajni and Singh, *Indocurculio minutus* Pajni, Singh and Gandhi, *Apotomorrhinus cribratus* Schonherr, *Sitophilus rugicollis* Casey, *Apion* (*Thymapion) majorinum* Faust, *Acallopistus* sp., *Hypera postica* (Gyllenhal), *Tanymecus indicus* Faust. (F-Curculionidae), *Bruchidius albizziae* Arora, *B. pygomaculatus* Arora, *B. saundersi* (Jekel) and *B. multilineolatus* Arora (F-Bruchidae).

**Keywords:** Curculionids, Bruchids, Plant resource, Niche differentiation.

## 1. Introduction
On account of much structural variation in the mouth parts of insects, they show a remarkable adaptation for feeding on different resources. Accordingly, we recognize specialized categories of insects such as Leaf eaters, Stem borers, Root eaters etc. Thus partitioning their food resources. Apart from the general categorization, the insect species also have the capacity to use the same plant or similar plants in such a way that the resources are exploited fully without affecting the foraging behavior of the feeding species. There are numerous examples where different parts of a plant are consumed by different species. Such species can belong to a single genus or have their relationship with more genera. At the same time, the same part of the host plant is attacked by several species one after the other showing the process of Temporal Partitioning of resources. The partition of resources takes place when the concerned consumers adopt different strategies to avoid competition. This process is technically known as Niche Differentiation. The partitioning may be brought about by several methods which may be called as Temporal Partitioning, Spatial Partitioning, Morphological Partitioning and Chemical Partitioning caused by the use of communicating chemicals such as oviposition markers, food markers etc. The author reports the case of some beetles expressing temporal partitioning.

## 2. Observations & Discussions
13 species of beetles associated with 5 plant species have been studied with respect to their temporal partitioning of food resources.

***a. Eugenia jambolana* Lam. (Family-Myrtaceae):** Commonly called as "Jamun ", the tree is quite common in Chandigarh and adjoining states of Punjab & Haryana. Three curculionid species viz. *Curculio c- album* (sub family Curculioninae), *Apotomorrhinus cribratus* (sub family Baridinae) and *Sitophilus rugicollis* (sub family Rhynchophorinae) attack the fresh fruits between May & August. All the 3 species breed in the seeds. The larvae of *C. c-album* and *A. cribratus* tunnel through the mesocarp before settling in the seeds, the females of *S. rugicollis*, on the contrary, occupy the fruits which have fallen to the ground and deposit eggs into the cotyledons of the mature fruits. Out of the first 2 mentioned species, the former attacks the fruits about 15 days before the attack of the latter species and accordingly completes its development earlier than the other species. In this manner, all the 3 species avoid the competition and fully exhaust the available food resources.

***b. Ficus infectoria* Willd. (Family: Moraceae):** The fruits of this species are attacked by 2 species from sub family Curculioninae namely *Curculio ficusi* and *Indocurculio minutus*. They also show temporal partitioning of the food as *C. ficusi* attacks the fruits about 2 weeks earlier than *I. minutus*. Despite general agreement in their development, the oviposition site also differs in the two cases.

***c. Abutilon indicum* (Linn.) (Family: Malvaceae):** A more or less similar case of temporal partition is witnessed in the case of *Acallopistus* sp. and *Apion* (*Thymapion*) *majorinum* which are associated with this plant species. A (T) majorinum lays its eggs in the calyx, the newly hatched larva tunnels towards the thalamus and completes its development there only. *Acallopistus* sp. oviposits directly on the seeds and completes its development by consuming the seeds. There is a gap of about one month in the completion of development in the two species. Besides temporal partitioning, both the species exhibit spatial partitioning as well. The 2 species utilize different foods namely thalamus tissue and seeds for completing their development.

***d. Trifolium alexandrinum* L. (Family: Fabaceae):** A fodder crop in Chandigarh and surrounding areas, the plant is attacked by 2 species belonging to 2 different subfamilies. *Tanymecus indicus* (s. f. Brachyderinae) appear on the host plant towards the end of October, feed on the leaves and lay eggs in the soil. The emerging larvae are root feeders. *Hypera postica* (s. f. Hypeinae) make appearance in the field during the month of December. Both the larvae and the adult consume leaves of the host plant. The above mentioned 2 beetles also thus exhibit both temporal and spatial partitioning leading to their coexistence on the same host.

***e. Albizia lebbeck* Benth. (Family- Fabaceae):** Four species of bruchids attack the pods of *A. lebbeck* [1]. They attack the pods one after the other. The fresh pods appear on the plants during the month of September and mature by the end of December, although dry pods keep on hanging on the tree right up to the end of the winter. *Bruchidius albizziae* starts its attack on the freshly formed pods at spots overlying the developing seeds. The young larva bores into the pod and then into the under lying seed and completes its development within 20 – 22 days. After this the adult beetles diapauses, under the bark of trees, dry fallen leaves or other such sheltering places. After a gap of about 2 weeks, *Bruchidius pygomaculatus* makes its appearance, attacks the developing seed. The adults escape from the seeds after completing their life cycle before diapausing. The 3rd species *Bruchidius saundersi* starts attack when the pods are more or less mature and the underlying green seeds have grown to their normal size. The species completes its development before the pods ripen and their color changes to yellow. Most of the adults escape the seeds but a few of them still remain within the pod and pass their diapause period within the seed cavities or in the spaces surrounding the seeds. *Bruchidius multilineolatus* is last to appear on the dry pods and complete its development in almost dry seeds. Most of the members of this species remain hidden within the dry pods. A few of them leave seeds for diapause at other places like the other 3 species of *Bruchidius*. After all the 4 species have completed their development, there are left hardly any unattacked seeds because this source has been fully exploited.

Apart from the above mentioned cases of 13 beetle species, many of other beetles also show some sort of partitioning including temporal one [2, 3, 4, 5, 6, 7, 8]. Moreover, most of the field insect species also express temporal, spatial, morphological and physiological partitioning of food.

## 3. Acknowledgements

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## 4. References

1. Arora GL. Taxonomy of the Bruchidae (Coleoptera) of North- West India. Part- 1 Adults. Oriental Insects Suppl 1977; 7:1-132.
2. Kalapanida M, Petrakis PV. Temporal partitioning in an assemblage of Insect defoliators feeding on Oak on a Mediterranean mountain. Eur J Entomol 2012; 109:55-69.
3. Stork NE, Hammond PM. Species richness & temporal partitioning in the beetle fauna of Oak trees (*Quercus robur* L.) 2013 In: Richmond Park, U. K. Insect Conservation and Diversity 2012; 6:67-81.
4. Venner S, Pélisson PF, Bel-Venner MC, Débias F, Rajon E, Menu F. Coexistence of insect species competing for a pulsed resource towards a unified theory of biodiversity in fluctuating environments. PLoS One 2011; 21:6(3):e18039.
5. Caughley G, Lawton JH, Plant-herbivore systems. In: Theoretical Ecology: Principles and Applications (May, R. M., ed.), Sinauer Assoc., Sunderland, MA.1981, 132-66.
6. Frankie GW, Vinson SB. Scent marking of Passion flowers In Texas by females of *Xylocopa virginica texana*. J Kansas Ent Soc 1977; 50:613-25.
7. Van-Alphen JJM, Boer H. Avoidance of scramble competition between larvae of spotted asparagus beetle, *Crioceris duodecimpunctata* by discrimination between unoccupied and occupied asparagus berries. Neth J Zool 1980; 30:136-43.
8. Waldbauer GP. The consumption and utilization of food by insects. Adv Insect Physiol 1968; 5:229-89.