

# SEASONAL OCCURRENCE OF DOMINANT LADY BIRD BEETLES (COLEOPTERA, COCCINELLIDAE) IN ALFALFA AGROECOSYSTEM, WESTERN SAUDI ARABIA

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## SUMMARY

Seasonal occurrence of dominant lady bird beetles (Coleoptera, Coccinellidae) in alfalfa agroecosystem, Western Saudi Arabia.

The dominant coccinellid beetles and their seasonal occurrence throughout the year in alfalfa agroecosystem in Hada Al-Sham area, Western Saudi Arabia was investigated. The species were collected, however only 3 species were dominant *Adonia variegata* (GOEZE), *Cydorina* (*Chilomenes*) *propinqua* (MULSANT) and *Coccinella undecimpunctata* (LINNAEUS) which represent 91.6% of the total beetles recovered. The population of the 3 species was clearly observed in the form of two peak activity periods. The 1st peak activity for the 3 dominant species occurred during November whereas the 2nd peak activity for *C. undecimpunctata* and *C. propinqua* was from February to March whereas for *A. variegata* it was from January to May. After the 1st peak activity the populations of all 3 species declined with the decrease in temperature due to the advent of the short winter season (late November to January), however violent increase in the populations of all 3 species started during January-February which led to the 2nd peak activity period for the 3 species. Each of the 3 predominant species has two generations per year.

**Key words:** Coleoptera, Coccinellidae, dominant, lady bird beetles, seasonal occurrence, alfalfa agroecosystem, Western Saudi Arabia.

## INTRODUCTION

The suppression of insect pests by indigenous arthropods is a basic component of contemporary rational management strategies. In order to achieve this effectively it is imperative to determine the role of the most important arthropod predators so that they may be conserved or manipulated to encourage their action against populations of most potential pests (Mc CARTY *et al.*, 1980). However, due to the limited amount of quantitative information available on predator efficiency, numbers needed to maintain these pests below specified action levels is unclear.

The Coccinellid beetles have a well known reputation as important polyphagous predators feeding voraciously on a variety of pests including aphids, coccids, psyllids, whitflies, mealybugs, scale insects, soft-bodied insects and a myriad number insects (KRING *et al.*, 1985; HONEK, 1985; HUFFAKER & MESSENGER, 1976; ANDOW & RISCH, 1985) and have been used in the applied biological control programs since laboratory rearing has a low cost of production (SINGH, 1977).

Saudi Arabia is currently witnessing an unprecedented exploration in its agri-

cultural potential especially for crops that are used for food, feed or forages for human and animal consumption. Alfalfa *Medicago sativa* L. (Berseem Hidjazi) is considered one of the best forages in Saudi Arabia and historically a major crop in desert, arid and semi-arid regions of Saudi Arabia. It is traditionally cultivated in desert oases, valley pockets for eons of time making an integral component of the "Oasis-mosaic" either planted separately or intercropped with date-palm and citrus trees. With the current "oases sprawl" (FARAGALLA, 1983), and expansion in agro-desert (FARAGALLA, 1988) more acreage has been cultivated with alfalfa to meet the demand for huge animal and poultry production. It is infested with a number of dangerous pests that usually reach economic levels (ABU-THORAIA, 1982; TAMIMY, 1985). Alfalfa is, by its nature of permanent greenery, an attractive crop in the desert that lures an array of pests which are local, migratory or transient.

Different methods of control have been adopted for dangerous pests including cultural and chemical methods but due to the problems and side-effects created by chemicals the current trend inspired people to be more inclined towards the biological control approach since a rich fauna of predaceous arthropods were collected (TALHOUC, 1984; FARAGALLA, 1985).

The objectives of this study were to generate more information on the most dominant species of coccinellid beetles in alfalfa agroecosystem and to determine their seasonal occurrence.

## MATERIALS AND METHODS

The test was conducted in King Abdul Aziz University research farm which belongs to the College of Meteorology, Environmental studies and Arid Land Agriculture at Hada Al-Sham area 125 Km NE of the city of Jeddah. Data collection lasted from October 1986 to September 1987. The predator sampling program included intensive sampling surveys which were conducted in an area of 7 1/2 donums (Donum = 1000 m<sup>2</sup>) which is equivalent to .75 ha. This area was considered a sampling universe and it was situated in the middle of a 30 ha. alfalfa solid field to cater for margin effect. All samples during the whole year were recovered weekly from this determined sampling universe. The beetle collection was done by a sweep net by taking 100 double sweep net samples using a stratified design. A 38-cm-diameter muslin sweep net with 100 cm handle was used following the technique of Kogan and Pitre (1980). Four samples each consisted of 25 double sweeps vigorously passed through the foliage while walking inside the crop. Usually during post strip-harvesting the net passed through the entire plants. As alfalfa grew taller, the net was passed through the upper third of the canopy. On all sampling dates, samples were placed directly into plastic bags, labeled then taken to the lab. Weekly data were added together to give total numbers recovered per month to facilitate analyses. All lady bird beetles were counted, identified and compared with voucher specimens in the Insect Collection of the Dept. of Biological Sciences. Species difficult to be identified or those that needed confirmation were sent to the British Museum, Natural History and to the Insect Taxonomy Division, Research Centre in the Ministry of Agriculture, Cairo, Egypt.

## RESULTS AND DISCUSSION

Table 1 showed that 10 species of coccinellid beetles were recovered from the alfalfa agroecosystem during the present study. The most predominant species include the eleven spotted lady beetle commonly known by the acronym CII *Coccinella undecimpunctata* (LINNAEUS), the thirteen spotted lady beetle *Adonia variegata* (GOEZE) and the three-lined lady beetle *Cydonia (Chilomenes) propinqua* (MULSANT). They represent 91.6% of the total coccinellid fauna recovered from the alfalfa agroecosystem. The presence of these 3 dominant species is clearly observed during the sampling period. Out of the 3 species only *C. undecimpunctata*

Species	Month												Total	%
	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.		
<i>Coccinella undecimpunctata</i> LINNAEUS	0	227	16	4	70	81	15	6	0	0	0	0	419	38.2
<i>Adonia variegata</i> MULSANT	0	69	21	17	32	44	62	86	30	4	6	0	371	33.9
<i>Cydonia (Chilomenes)</i> <i>propinqua</i> MULSANT	0	29	0	6	73	82	16	8	0	0	0	0	214	19.5
<i>Coccinella septempunctata</i> LINNAEUS	0	29	0	0	0	0	0	0	0	0	1	0	30	2.7
<i>Coccinella-9-punctata</i> LINNAEUS	0	29	0	0	0	0	0	0	0	0	0	0	29	2.6
<i>Hippodamia variegata</i> (GOEZE)	0	10	0	0	0	0	0	0	0	0	0	0	10	0.9
<i>Adalia bipunctata</i> LINNAEUS	0	9	0	0	0	0	0	0	0	0	0	0	9	0.8
<i>Exochomus nigripennis</i> (ERICHSOHN)	0	3	0	0	0	0	0	0	0	0	0	0	9	0.7
<i>Chilomenes vicina (var)</i> MULSANT	0	2	0	0	0	0	0	0	0	0	0	0	2	0.2
<i>Coccinella</i> sp. (unidentified)	0	1	2	0	1	0	0	0	0	0	0	0	4	0.4
Total	0	408	39	27	176	207	93	102	33	4	7	0	1096	99.9

Table 1: Percentage of lady bird beetle recovered from alfalfa agroecosystem during the period October 1986 - September 1987, Hada Al-Sham area, Western Saudi Arabia.

exhibited an outstanding abundance. Fig. 1 showed that the 3 species have two pronounced activity periods. Two species *C. undecimpunctata* and *C. propinqua* both have their peak activity periods simultaneously. The first peak activity for both occurred during November, then their populations decreased with the fall in temperature due to the short winter season during late November to January where they both have their lowest population numbers. During January and with the gradual increase in temperature rapid increase in population numbers of both species was effected which was culminated in a 2nd peak activity period higher than the previous peak for *C. propinqua*, during February and March. After March the populations of both species dropped rapidly during April and May and their specimens never collected in samples after June which indicated that they had entered into aestivation from July to October. The 3rd ladybird beetle *A. variegata* has its first activity period during November, then its population dropped between late November-January. After January the populations increased rapidly extending from January onwards to give the 2nd main peak activity during May. Then the population dropped suddenly during June-July with very low fluctuating population between July and September and then no specimens were recovered which indicated that it has a short period of aestivation during September to October. Our results were in agreement with ALIKHAN & YOUSUF (1986) who reported that the most favorable temperature for egg laying and hatching was at 30°C and the lowest for both is less than 26°C and more than 34°C (Fig. 1).

We may conclude from this study that the 3 dominant species of ladybird beetles each has 2 generations per year. The first generation for the 3 species is

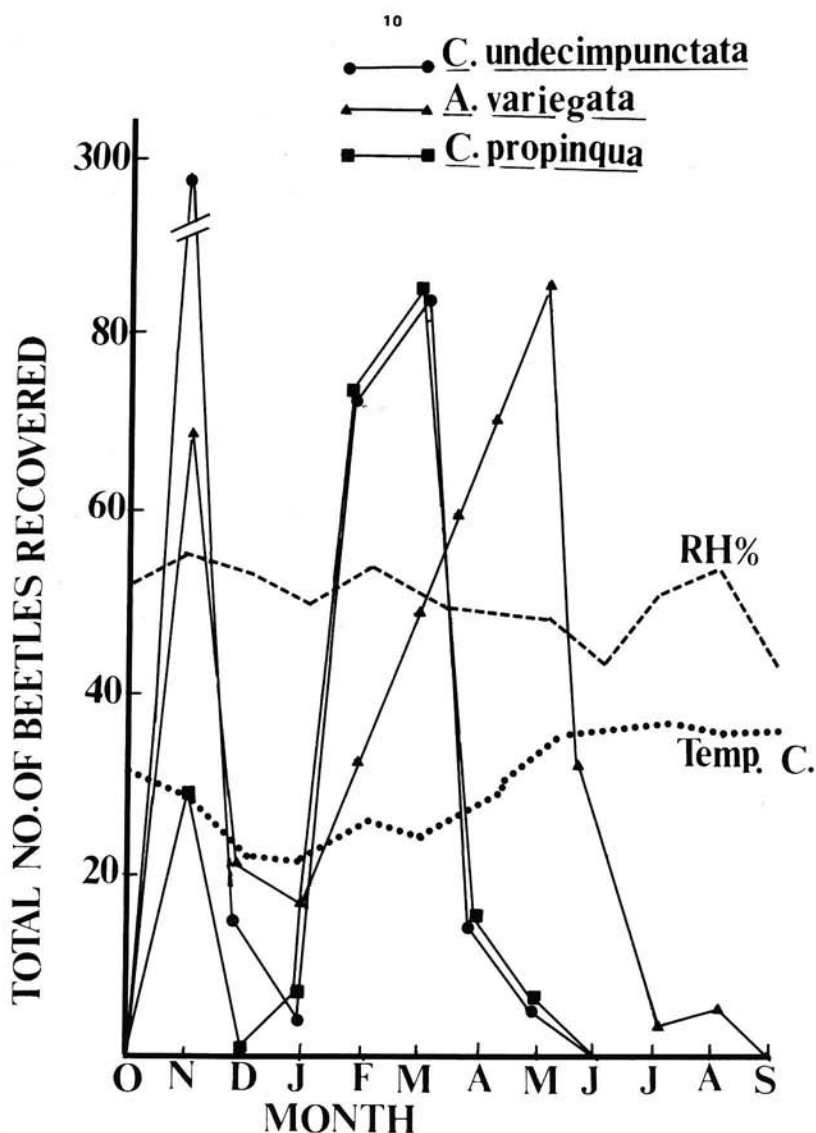


Fig. 1: Seasonal occurrence of dominant coccinellid beetles in alfalfa agroecosystem, Hada Al-Sham area, Western Saudi Arabia.

active from October to December, whereas the 2nd generation for a longer period, from January to June for *C. undecimpunctata* and *C. propinqua* while for *A. variegata* between January to July.

#### ACKNOWLEDGEMENTS

The authors wish to extend their deep appreciation and gratitude to the British Museum Natural History and The Insect Taxonomy Division, Research Centre, Ministry of Agriculture, Cairo, Egypt for their help in the identification of the coccinellid collection.

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(Received 10 February 1989; accepted 16 October 1989.)