SECTION C

A SUGGESTED STRATEGY FOR INTEGRATED MANAGEMENT OF CALLOSOBRUCHUS ANALIS ON CHICK-PEA.
CHAPTER X.

A SUGGESTED STRATEGY FOR INTEGRATED MANAGEMENT OF

CALLOSOCRUCHUS ANALUS IN CHICK-PEA.

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CHAPTER X.

A SUGGESTED STRATEGY FOR INTEGRATED MANAGEMENT OF CALLOSOBRCUS ANALIS ON CHICKPEA.

On basis of results of the present project an integrated management strategy for control of Callosobruchus analis, infesting stored chickpea, is suggested here. Feasibility and effectivity of the suggestions could not be tested in commercial stores due to lack of necessary facilities. The suggestions are being putforth with the hope that they could provide a basis for future large scale enquiries involving commercial stores.

The suggested plan has two main components, viz.:

(a) Biological control of Callosobruchus analis using Dinarmus basalis.

(b) Sterility method of control using thermal stress induced sterility in Callosobruchus analis.

Let us consider the two control methods separately and in some detail, and then their application in a coordinated manner will be suggested.
(a) **Biological control.**

Augmentation approach in biocontrol of *Callosobruchus analis* using *Dinarmus basalis* is proposed. A prerequisite for this approach is mass multiplication of the parasite. For this a simple, convenient and economical method has been described in the CHAPTER VIII.

It has been noted earlier that *D. basalis* has a poor host location capacity (CHAPTER VI), and also that, if a vial with *D. basalis* adults is included in the bag containing *C. analis* infested chickpea seeds, a considerably higher degree of repression of the pest is achieved than when parasites are released close to such a bag with mouth open (CHAPTER IX). It is suggested, therefore that for effective release of parasites an open vial, containing parasites, be inserted into each bag of chickpea through a small portion of the mouth of the bag, which has been opened for this purpose, and is closed after the vial insertion. As parasites require for their development relatively high water contents in seeds, parasite releases should be attempted in earlier months after bringing in of fresh chickpea from the field in the store and when atmosphere is more humid, i.e. from June to October. In June to August the extent of bruchid
infestation in the gram store is small, and releases will serve to contain the infestation at a low level. As *D. basalis* females feed and oviposit mostly on older bruchid larvae, for successful releases it is necessary that repeated monitoring of bruchid stages in the store is done, and releases are made only when the bruchid is mostly in the penultimate/last larval stage. It has been noted in the present study that synchronization fails to develop between the lifehistories of *C. analis* and *D. basalis*. Hence a few repeated releases of *D. basalis* will be necessary. Suggested number for release: 300 to 500 females of *D. basalis* along with some males for a bag of 100 kg seeds, presuming 1 to 2% bruchid infestation among the seeds.

(b) Sterility Method of Control:

It has been noted in the present study that, if *C. analis* is reared from the old larval stage onwards at 41 to 42° C, the resulting individuals of either sex are relatively sterile, but as much acceptable in mating to the opposite sex as normal individuals. This situation may be utilized for keeping a bruchid population under check, specially when seeds in store have become too dry, and
biocontrol through *D. basalis* is not quite feasible.

Mass rearing of the parasite, *D. basalis* and production of heat stressed individuals of *C. analis* may be done in a simple laboratory set up side by side, and setting up such an establishment will not be a costly proposition. Moreover work in such an establishment may be managed by semi-skilled hands.

(c) An integrated approach involving the above two methods:

It is suggested that in earlier months of gram storage, i.e. June to October, periodical monitoring of developing bruchid stages be done, and that, when bruchids are in old larval stage, inundative/inoculative releases of *D. basalis* be done. For such releases freshly emerged adults from mass rearing cultures should be collected in vials, and such a vial without stopper be inserted into each bag by opening the mouth of the bag to a small extent, and, after pushing in the vial, stitching up the mouth again. Such releases be done two to three times at intervals of 40 days each. Then in winter, i.e. from November onwards two to three releases of
heat stressed individuals of *Callosobruchus analis* into the store be done (fig. 1). This will render a number of bruchid matings sterile, and thus a check on bruchid population size will be imposed.

The sterility method may be used side by side with the biological method in earlier months also.

Sailer (1976) has included the sterility method of control, genetic manipulations, use of growth regulators etc. in the broad category of biological control methods, and has referred to them as "parabiological methods", and use of parasites and predators as "classical biological control". Thus both the methods, suggested here, are biological methods. They may suitably be combined with other compatible methods in an integrated strategy. Among other methods could be growing and storing bruchid resistant varieties of chickpea. Search for such resistant varities of legumes is already on (Fitzner et al, 1985; Messina et al, 1985 and 1985a).

References:

diversity in the suitability of cowpea (Rosales: Leguminosae) pods and seeds for cowpea weevil (Coleoptera, Bruchidae) oviposition and development. J. Econ. Entomol., 78: 806-810.


STORE DRIER:
BRUCHID:
HENCE BIOCCNPCC
INFESTATION
THROW D. BASALIS:
3 RELEASES OF
NOW, SWITCH OVER
WILL NOT STICKER
THROUG D. BASALIS
- HENCE BIOCCNPCC
STORE DRIVER

C. ANAULIS
INDIVIDUALS OF
HEAT STRESSED
2 OR 3 RELEASES OF
NOW, SWITCH OVER
WILL NOT STICKER
THROUG D. BASALIS
- HENCE BIOCCNPCC
STORE DRIVER

RECEIVING FRESH
INOCULATIVE RELEASES
2 TO 3 INUNDATIVE/HEAT STRESSED
RECEIVING FRESH
DON'T BEFORE
60DOWNS WAS
CONTAINERS AND
CLEANING OF
NOW, IF NECESSARY
INFECTION VERY
ENDUCID

FROM FIELD
PEA IN STORE
FRESH CHICK
ARRIVAL OF