SUSCEPTIBLE STAGE OF THE DEVELOPING COTTON BOLL TO PINK BOLLWORM ATTACK

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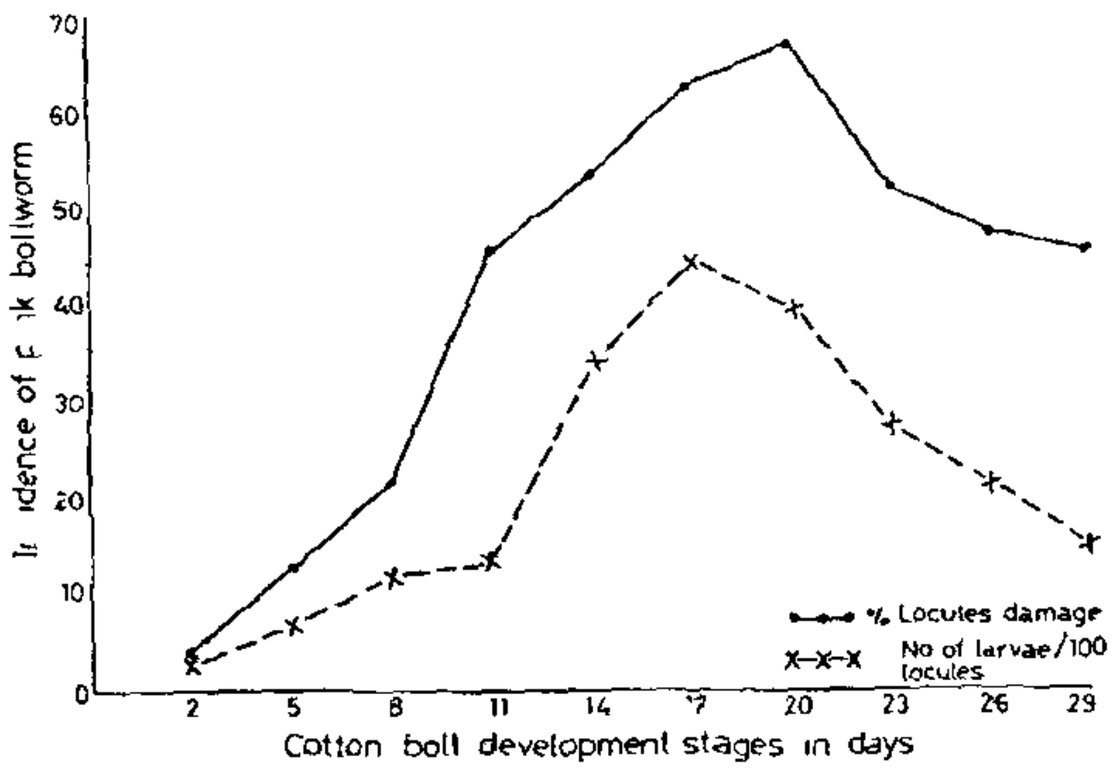
FOR successful development of insects, their various life stages should synchronize with the most preferred stage of the host plant or plant part. The boring and subsequent feeding on internal contents by the pink bollworm (*Pectinophora gossypiella Saunders*) larva causes severe shedding of squares, flowers and bolls in cotton. The green maturing cotton bolls are the most favoured site for pink bollworm oviposition. Brazzel and Martin[1] reported that 2 to 3 week-old green cotton bolls have a large number of pink bollworm eggs. Subsequently, the pink bollworm development was reported to be faster on more matured fruiting forms[2]. The insect survival is more on bolls that are infested before the boll was 20 days old as compared with those infested at a later stage of development.

Locally grown cotton variety H-14 was selected to arrive at the most preferred stage of the cotton boll to pink bollworm infestation. The percentage of locules damaged and the larval population per 100 locules were considered as indices. For this, all the flowers appearing were tagged daily from 1 September 1974. All the labelled bolls were plucked on 1 October 1974. The bolls of a particular age group were dissected and the total and damaged number of locules were recorded for individual bolls along with the number of pink bollworm larvae found inside. Finally the percentage of locules damaged and the number of pink bollworm larvae per 100 locules were calculated for each category of cotton bolls. The least incidence (4.2%) was noticed in 1–3 day-old cotton bolls while the highest (67.5%) was in 19–21 day-old bolls. Also the lowest larval population (2.67/100 locules) was found in 1-3 day-old bolls but the highest (45.00/100 locules) was in 16 18 day-old bolls.

The results indicate that the pink bollworm incidence progressively increased with the development of the cotton boll up to 21 days and thereafter declined (figure 1). Although the apparent differences in pink bollworm incidence from 13 to 21 day-old bolls are not significant it could be deduced that three week-old cotton bolls are preferred by pink bollworm larvae. Therefore plant protection measures against pink bollworm in cotton should be suitably adjusted to maintain their population below economic threshold level.



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A STRAIN OF *ORYZA BARTHI*, AN AFRICAN WILD RICE IMMUNE TO BACTERIAL BLIGHT OF RICE

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SUSTAINED efforts made in our laboratory have identified a strain of *Oryza barthii* (an African wild rice form with vigorous rhizomatous growth) immune to bacterial blight. Hundres of inoculations from 1975 to 1980 with *Xanthomonas campestris* pv. *oryzae* isolates from different parts of India either by spraying, clipping, pin-pricking or by injecting dense bacterial suspension into the mid-rib failed to show even the slightest infection. Age of the plant (20 100 days), age of the leaf (2 30 days), level of nitrogen (25 150 kg N/ha), inoculum concentrations ($5 \times 10^2 - 5 \times 10^4$ cells/ml) and different environmental conditions could not influence the immunity of this wild rice strain.

Physiology of the rice leaf is drastically affected by injuring the leaf at the base. Such altered physiology is found to enhance the lesion length 3 4 times more in the resistant cultivar[1]. But even such injury did not

influence the immunity of this wild rice strain.

Besides its immunity to *X. campestris* pv. *oryzae*, it is also immune to *X. campestris* pv. *oryzicola* (bacterial leaf streak), *Pyricularia oryzae* (blast) and resistant to Drechslera *oryzae* (brown spot) and *Corticium sasakii* (sheath blight) when inoculated artificially with four aggressive isolates of the respective pathogens.

This immune strain of *O. barthii* would be an excellent material for investigating host-parasite relationship, inheritance of disease resistance, breeding for disease resistance and pathotype classification. Use of this strain in studying the above aspects of bacterial blight should greatly influence our way of thinking. As this strain is also immune or resistant to a number of other rice pathogens it can be used as a multiple disease resistant donor to incorporate the resistance to all these pathogens along with bacterial blight resistance in *O. sativa* background.

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THE DEVELOPMENT OF EMBRYO IN *LYCOPSIS ORIENTALIS* LINN.

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BORAGINACEAE is interesting and unique in manifesting sufficient diversity in the genesis of megagametophyte, endosperm and embryo[1-14], but compared to the extensiveness of the family, embryological studies are less satisfactory[1]; though four main types of embryogeny—asterad, onagrad, solanad and chenopodiad—are known in the family. In view of these facts, the present report is timely. Earlier, one of us (BHR) has critically studied embryology of 18 taxa of the family. Of these *Lycopsis orientalis* Linn. (subfamily Boraginoideae) showed variation in the type of embryogeny from that in *Lycopsis arvensis*[2]. The developmental details of the embryo in *Lycopsis orientalis* are given below.

The first division of the zygote is transverse and takes place only subsequent to the formation of considerable amount of endosperm, which is *ab initio* cellular, engendering the apical cell *ca* and basal cell *cb* (figures A and B). The division in *cb* precedes that in *ca* resulting in a middle cell *m* and the lower cell *ci*; the latter eventually playing a major role in the formation of a suspensor (figure C). Both *ca* and *m* undergo division simultaneously forming two juxtaposed cells in each of these tiers (figure D); thus a proembryo comparising five cells disposed in three tiers *ca*, *m* and *ci* is organised (figure D). Of the two cells of the tier *ca* the one that is slightly bigger undergoes division followed by an oblique wall demarcating a triangular apical cell which functions as the epiphyseal initial *e* (figures E–J). The three cells derived from *ca* constitute the tier *q*. The cell *ci* segments by a transverse wall to result in two superposed cells *n* and *n'* (figures G and H). The two cells of the tier *m* subsequently divide by another longitudinal division leading to the formation of four circumaxially arranged cells (figures F–H). Vertical divisions in these cells lead to the differentiation of dermatogen, periblem and plerome (figures K–M). In the meantime the cells *n* and *n'* divide transversely engendering four superposed cells *r*, *t*, *o* and *p* (figures H–M). By about the time the cells of the tier *m* segment, the cells of the tier *q* divide marking off dermatogen, periblem and plerome (figures G–N). The epiphyseal cell also divides by a vertical wall resulting in two juxtaposed cells (figure K). These in turn divide vertically at right angles to each other followed by periclinal divisions resulting in two groups of cells (figures L and M) of which the outer personates the first epidermal cells of the shoot apex and the inner represents the cortex. By further divisions the epiphyseal region becomes massive. Meanwhile the cell *r* divides transversely resulting in two superposed cells of which the lower one functions as the hypophyseal cell, while the upper cell together with *t*, *o* and *p* organizing into a linear suspensor of not more than six cells (figures L and M).

Thus, the derivatives of both *ca* and *cb* are involved in the genesis of the embryo proper. The shoot apex is organised from the derivatives of the epiphyseal cell *q*, whereas the cotyledons are from the other cells of the tier *q*. The tier *m* and its derivatives organise the hypocotyl and root cortex. The root apex and root cap are derived from the derivatives of the tier *r*, whereas the *t*, *o* and *p* together function to form the suspensor. Thus the embryogeny keys out to the Geum variation of the Asterad type of Johansen[3] and corresponds to the Period I, Megarchetype II and