identical to that of *S. francesae*. Since 3 parvalbumin loci are present in the genomes of nearly all goodeid fishes (Turner, unpublished data) we assume that the common ancestor of all 4 *Skiffia* species had 3 parvalbumin loci, and that the 2-parvalbumin phenotype of *S. lermae* resulted from the loss (= mutation to silence?) of 1 of the ancestral parvalbumin genes. Our sample of *S. multipunctata* is apparently polymorphic for the number of parvalbumin genes present or expressed.

The number of loci that apparently encode the homologous groups of proteins in each species are summarized in the table.

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Effect of different food plants on the development and reproduction of *Heliothis armigera* (Hbn.)

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Summary. Studies on the rate of development and reproduction of *Heliothis armigera* Hbn. on 8 different food plants at 26±2 °C revealed that cotton was the most suitable host and tomato and sorghum were the least suitable.

The gram pod borer, *Heliothis armigera,* is a polyphagous and notorious pest causing economic damage to several crop plants. Outbreaks of this pest in cotton crops are closely associated with the availability of other host plants in the environment[1]. So it is necessary to study the suitability of alternative host plants for its development, using some economically important plants. The net reproductive rate, weight of the pupae and percentage of pupae and moths formed were the criteria used to compare different host plants.

Materials and methods. The food plants used for this study were bengalgram, (*Cicer arietinum* L.), redgram (*Cajanus cajan* L.), lab-lab (*Dolichos lab-lab* L.), (*Gossypium hirsutum* L.), tomato (*Lycopersicon esculentum* Mill.), sorghum (*Sorghum vulgare* Pers.), maize (*Zea mays* L.) and sunflower (*Helianthus annuus* L.). A laboratory culture of *H. armigera* was used for this study. A known number of adult pairs were released for egg-laying in cages (30×30 cm). Eggs laid on white muslin cloth were collected with a wet camel-hair brush and 100 eggs were kept for hatching.

Table 1. Development and reproductive performance of *Heliothis armigera* on various food plants

Host	Mean egg period (days)	Mean larval period (days)	Mean pupal period (days)	Mean weight of pupae (mg)	Mean pre oviposition period (days)	Mean oviposition period (days)	Mean No. of eggs per female	Percentage pupae formed	Percentage moths formed	Net reproductive rate
Bengal gram	3.6 (3-4)*	19.2 (18-20)	13.2 (13-15)	181 (160-195)	2.7 (2-3)	7.6 (7-9)	518 (297-619)	76.0	75.0	208.56
Redgram	3.5 (3-4)	17.0 (15-18)	12.5 (9-14)	202 (189-220)	3.2 (3-4)	6.7 (5-8)	398 (186-452)	80.0	80.0	164.85
Lab-lab	2.9 (2-4)	19.0 (17-20)	12.9 (10-14)	234 (220-251)	3.3 (2-4)	7.2 (6-9)	628 (493-782)	78.5	78.0	236.98
Cotton	3.2 (2-3)	18.3 (16-20)	12.6 (10-13)	273 (262-280)	3.8 (3-5)	9.8 (7-11)	1346 (889-1562)	84.0	84.0	537.05
Tomato	4.3 (3-5)	20.0 (17-22)	13.0 (12-15)	162 (142-179)	3.4 (3-4)	6.7 (5-7)	387 (112-429)	78.0	76.0	140.63
Sorghum	3.6 (3-5)	19.8 (17-24)	13.5 (11-16)	157 (133-156)	3.3 (3-4)	6.5 (4-7)	434 (341-513)	70.0	70.0	145.26
Maize	4.2 (3-5)	18 (15-20)	12.8 (10-14)	230 (220-240)	2.5 (3-4)	8.3 (7-9)	651 (511-828)	80.0	80.0	260.48
Sunflower	3.8 (3-5)	19.5 (14-23)	13.3 (11-15)	262 (249-279)	3.0 (2-4)	8.2 (6-9)	781 (319-917)	81.0	80.5	306.56
CD (p=0.01)	1.153	NS	NS	4.818	NS	0.925	13.109	0.999	2.011	-

* Figures in parentheses are ranges. NS, not significant.

Table 2. Correlation between different developmental criteria of *H. armigera* on different food plants

Correlation between	(Spearman's rank correlation coefficient)
Weight of pupae and net reproductive rate	0.9286**
Weight of pupae and percentage of pupae	0.8809**
Weight of pupae and percentage of moths	0.8808**
Weight of pupae and mean number of eggs per female	0.8571**
Larval period and pupal period	0.8334**
Oviposition period and weight of pupae	0.8333**
Oviposition period and net reproductive rate	0.9286**
Oviposition period and mean number of eggs per female	0.8809**
Percentage of moths and net reproductive rate	0.7619*
Percentage of moths and mean number of eggs per female	0.6430*

* $p<0.05$, ** $p<0.01$.

Immediately after hatching, the larvae were transferred on to various feeding materials kept in plastic containers (5×5 cm). The feeding materials were renewed daily in the morning until all the larvae pupated. All pupae were weighed within 24 h of formation[2]. The adults emerging on a particular day were paired and released in separate cages for egg-laying. The fecundity of the females on subsequent days was noted until all the females died. The number of eggs laid per female was divided by 2 to obtain the number of female births (mx) (sex ratio 1:1). Observations from the hatching of the eggs till the emergence of adults were recorded daily, providing the values ($1\times$) used to calculate the net reproductive rate ($Ro=\Sigma 1xmx$)[3]. Spearman's rank correlation coefficients (rs) were calculated in order to find which developmental criteria were significantly associated.

Results and discussion. The egg period was maximum on the tomato (4.3 days) and minimum on the lab-lab (2.9 days). The larval and pupal periods were maximum (20 and 13.5 days) on the tomato and sorghum respectively and minimum (17 and 12.5 days) on the redgram (table 1). The larvae developed most rapidly on maize silks and slowest on sunflower corollas and receptacles[4].

The weight of the pupae, percentage of pupae and moths formed, mean number of eggs per female and the ratio of total female births in 2 successive generations were maximum on cotton. The weight of the pupae and the percentage of moths were less on the sorghum. This agrees with the finding of Pretorius[2]. The differences in these parameters among the hosts might have been due to the nutritional qualities of the various diets.

Correlation between different developmental criteria are presented in table 2. No significant correlation was found between the following: percentage of pupae and pupal period; weight of the pupae and pupal period; percentage of pupae and mean number of eggs per female; pupal period and mean number of eggs per female; percentage of pupae formed and net reproductive rate.

The results of this study thus show that cotton is the most suitable host and tomato and sorghum are the least suitable hosts, among the hosts tested for *H. armigera.*

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