



SURVIVAL OF COTTON STEM WEEVIL *PEMPHERULUS AFFINIS* FAUST AS INFLUENCED BY STACKING CONDITIONS

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ABSTRACT

The survival of lifestages viz., larval, pupal and adult of the cotton stem weevil *Pempherulus affinis* Faust was studied under different stacking conditions viz., cotton stalk heaped, sun drying of cotton stalks, sprinkling of water once in every five days, and cotton stalks in submerged condition. The treatment of sun drying of cotton stalks (T3) revealed the least survival of larva, pupa and adult at 10, 20, 30 and 40 days after stacking (DAS); it was 37.62, 28.43, 26.92 and 19.97%, respectively. Maximum survival of 73.07, 65.70, 58.38 and 49.22% was obtained with sprinkling of water once every five days (T2) at 10, 20, 30 and 40 DAS, respectively. Thus, sun drying of cotton stems after harvest has been observed to arrest the carryover of the pest to the succeeding crop.

Key words: *Pempherulus affinis*, lifestages, survival, stacking condition, sun drying, sprinkling of water, heaped, submerged conditions, larva, pupa, adult, cotton stalks, carryover

Cotton is the most important agricultural crop to the textile industry which is being infested by several pest. India is one of the largest producer of cotton in the world with the average area of 123.71 lakh hectares with production and productivity of 311.17 lakh bales and 428 kg/ hectare respectively (Cotton Corporation of India, 2023). Among several pest, cotton stem weevil affects the crop at the early stage leading to the drastic reduction in production. The infestation of cotton stem weevil *Pempherulus affinis* Faust starts with laying of eggs in the soft, succulent, nodal region of the plant by the adult which make excavated hole for placing eggs (Parameswaran and Chelliah, 1984). The grubs tunnel into the stem and damage the vascular tissues, resulting in gall formation just above the ground level and wilting of seedlings occurs (Anandhi et al., 2020). Pupation takes place in the feeding area inside the stem known as pupal chamber and the pupa is exarate. The adults while emerging cuts through the bark of the stem and begin to feed on the succulent part of the bark of the stem (Ayyar, 1918). The current study was conducted to generate information on the potential survival of *P. affinis* under different stacking conditions, and to evaluate the carryover of the populations.

MATERIALS AND METHODS

The experiment was conducted at the Insectary (Department of Agricultural Entomology), TNAU, Coimbatore. The infested stalks from the field was

pulled out and were kept in buckets in four different conditions viz., cotton stalks in heaped condition, cotton stalks with sprinkling of water once every five days, sun drying of cotton stalks and cotton stalks in submerged condition (wet mud was used to cover the stalks). Completely randomized design was used for the study in which all the treatments were replicated five times. At 10 days interval, ten cotton stalks from each replication were split open and observed for the presence of live larva, pupa and adults. The live larvae, pupae and adult are calculated in % (Parameswaran, 1983). The data on % weevil infestation were arc sine transformed before subjecting to the Duncan's Multiple Range Test (DMRT, $p=0.05$), and in the means were tested for significance (Gomez and Gomez, 1984).

RESULTS AND DISCUSSION

The survival of lifestages of *P. affinis* under different stacking conditions given in Table 1 reveal that among the different stacking conditions, sun drying of cotton stalks (T3) recorded the least % survival; at 10 days after stacking (DAS), the survival of larvae, pupae and adult with sun drying of cotton stalks (T3) was 48.57, 31.66, and 32.63%, respectively. Cotton stalks in heaped condition (T1) were the next, and was more or less on par with cotton stalks in a submerged condition (T4); sprinkling of water once every five days (T2) showed maximum survival 85.23, 56.66 and 77.73% with larva, pupa and adult, respectively. At 20 DAS, these survival

Table 1. Studies on potential survival of *P. affinis* under different stacking conditions

Treatments	10 DAS			20 DAS			30 DAS			40 DAS			Mean life stages (%)
	Larva	Pupa	Adult	Larva	Pupa	Adult	Larva	Pupa	Adult	Larva	Pupa	Adult	
T1	76.66 (61.33) ^b	36.66 (37.19) ^{ab}	70.16 (56.98) ^b	65.00 (53.97) ^b	39.99 (39.14) ^{ab}	55.97 (48.43) ^b	59.98 (50.81) ^b	35.66 (36.58) ^b	47.52 (43.54) ^{bc}	53.33 (46.93) ^b	29.66 (32.76) ^b	44.66 (41.88) ^b	42.54 (40.68) ^b
T2	85.23 (67.38) ^c	56.66 (48.87) ^c	77.73 (61.82) ^c	77.00 (61.35) ^b	52.66 (46.57) ^b	67.46 (55.26) ^c	69.99 (56.82) ^c	49.99 (44.98) ^c	55.13 (47.93) ^c	63.33 (52.76) ^b	36.33 (36.94) ^b	48.00 (43.83) ^b	49.22 (44.53) ^c
T3	48.57 (44.16) ^a	31.66 (34.19) ^a	32.63 (34.81) ^a	37.62 (37.81) ^a	28.32 (32.09) ^a	27.14 (31.24) ^a	29.99 (33.14) ^a	22.66 (28.29) ^a	20.95 (29.99) ^a	26.66 (30.91) ^a	17.99 (25.07) ^a	15.23 (22.95) ^a	19.97 (26.48) ^a
T4	79.52 (63.34) ^{bc}	49.99 (44.98) ^{bc}	65.90 (54.28) ^b	65.14 (53.92) ^b	46.00 (42.67) ^b	48.58 (44.16) ^b	64.99 (53.81) ^{bc}	41.32 (39.93) ^{bc}	44.16 (41.62) ^b	50.17 (45.07) ^b	37.99 (37.98) ^b	40.66 (39.57) ^b	45.11 (42.16) ^{bc}
S.Ed.±	2.56	4.42	1.70	3.59	3.94	2.36	2.73	3.46	2.40	3.67	2.92	2.20	1.58
CD (p= 0.05)	5.43	9.36	3.61	7.60	8.34	4.99	5.70	7.33	5.10	7.79	6.19	4.66	3.36

T1- Cotton stalks in heaped condition; T2- Sprinkling of water every five days; T3- Sun drying of cotton stalks; T4- Cotton Stalks in submerged condition; DAS- Days after stacking. Mean of five replications. Each replication mean of ten observations. Figures in parentheses are sine transformed values. In columns, means followed by different letters significantly different (DMRT, p=0.05)

values were found to follow similar trend, with sun drying of cotton stalks (T3) showing the least values. Similar trends were observed at 30 DAS, with survival of larvae, pupae, and adults in sun drying cotton stalks (T3) being 26.66, 17.99, and 15.23%, respectively; at 40 DAS, it was followed by cotton stalks in heaped condition (T1) with larvae survival of 53.33%, pupal survival of 29.66%, and 44.66% adult survival which was more or less comparable to cotton stalks in a submerged condition (T4). Sprinkling of water once every five days (T2) resulted in maximum survival of larvae (63.33), pupae (36.33), and adult (48.00). The results stated that the potential survival of mean life stages viz., larva, pupa and adult was recorded the least in the treatment of sun drying of cotton stalks (T3) 37.62, 28.43, 26.92% and 19.97% at 10, 20, 30 and 40 days after stacking, respectively; and maximum survival was recorded in sprinkling of water once in every 5 days (T2) - at 73.07, 65.70 58.38 and 49.22% at 10, 20, 30, 40 DAS. The least number of mean lifestages observed in sun drying of cotton stalks might be due to prevailing high temperature compared to other treatments. Many larvae and pupae were observed dead which prevented the emergence of adults. The emerged adults were also dead. The present investigation is in accordance with Murugesan et al. (2010) who reported that in-situ drying of pulled out cotton stalks from the field after harvest recorded no emergence of weevil whereas cotton stalks in heaped condition recorded emergence up to 66%. These results led to the conclusion that in-situ drying would arrest the carryover of pest to the succeeding crop. Parameswaran (1983) reported that emergence of adult was maximum in sprinkling of water once in five days which supports the present findings and also stated that the carryover potential of cotton stem weevil from pulled out cotton stalks in different storage days. The 10 days stored stem registered maximum number of live stages and very minimum population of live stages was noticed in the 60 days stored cotton stalks. The live stages were gradually decreased and beyond 60th day, no live stages was detected as the stem was completely dried up which are in accordance with our present findings.

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CONFLICT OF INTEREST

No conflict of interest

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