



EFFECT OF SEED TREATMENT WITH NON-TOXIC PLANT ORIGIN SUBSTANCES ON SEED QUALITY PARAMETERS OF GRAM DURING STORAGE

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ABSTRACT

A laboratory experiment was conducted to study the effect of different doses (0.2, 0.4, and 0.6%) of *Acorus calamus* (rhizome) and *Croton tiglium* (seed) powder on seed quality viz. 100-seed weight, germinability and vigour index of gram seed and their efficacy against the development of pulse beetle (*Callosobruchus chinensis* Fab.) during storage. Pre-storage seed treatment with *A. calamus* (rhizome) and *C. tiglium* (seed) powder in the proportion of 0.6% by seed weight was found most effective in maintaining better quality of seed and arresting the development of pulse beetle during storage.

Keywords: Gram, Storage, Seed quality, Pulse beetle, *Acorus calamus*, *Croton tiglium*.

INTRODUCTION

THE gram (*Cicer arietinum* L.) is a valuable pulse crop for its high protein content and vitamins and is used in our daily diet. Harvested seed were stored for varying periods before consumption or sowing purposes. Gram seed was found to be suitable host to pulse beetle during storage, causes loss to the seeds.

Pre-storage seed treatment with some sort of protectants to avoid pest infestation during storage is an old practice. Saxena et al. (1976) and Tikku et al. (1978) found *Acorus calamus* L. oil vapour responsible for causing infecundity among the females of a number of stored grain pests. The objective of the present investigation was to study the effect of different doses of *Acorus calamus* (rhizome) and *Croton tiglium* (seed) powder on seed quality of gram and their bio efficacy against the development of pulse beetle during storage.



MATERIALS AND METHODS

Gram (*Cicer arietinum* cv. Phule G-5) seed produced in 1996-97 were cleaned, dried (Moisture content 10%) treated (March, 1997) with two plants products viz. *Acorus calamus* (rhizome) and *Croton tiglium* (seed) powder each in the proportion of 0.2, 0.4 and 0.6% by weight of seed. The experiment was conducted in glass bottle of one litre capacity with seven treatments including untreated control. Each glass bottle was then filled with 500 grams of gram seeds. Ten pairs of 2-3 days old pulse beetle (*Callosobruchus chinensis* Fab.) maintained at 25 ± 2 °C on gram seed shaving 14% moisture at ambient temperature and relative humidity were released in each glass bottle covered with muslin cloth. The set of experiment was kept in well ventilated wire mesh almirah in mesonary building having cemented walls, roof and floor under ambient temperature (19 to 41°C) and relative humidity (20 to 40%) from March to May, 1996. After three months the grain from each treatment were keenly observed and those found infested were separated out and weighed to determine the infestation percentage on weight basis and then 100- seed weight and germination were tested quadruplicate with 100 seed in each replication. The germination percentage was evaluated (Anonymous, 1985) and vigour index was worked out following the method of Abdul Baki and Anderson (1973). The data were statistically analysed in RBD as per Panse and Sukhatme (1967)

RESULT AND DISCUSSION

The data regarding the effect of different doses of *A. calamus* (rhizome) and *C. tiglium* (seed) powder on population behaviour of pulse beetle, infestation percentage, 100-seed weight, germination percentage and vigour index of gram seed after 3 months of storage are given in Table-1.



The results indicated variation in number of pulse beetle (adult) in each treatment. Minimum population of pulse beetles was observed in treatments of *A. calamus* (rhizome) and *C. tigrimum* (seed) powder in the proportion of 0.6% on weight basis. The number of pulse beetle decreased with the increase in concentration. The active ingredient of the *A. calamus* (rhizome) and *C. tigrimum* (seed) may be responsible in arresting the developmental activities or causing mortality of the pulse beetle. The untreated control showed maximum population of pulse beetles during storage. *Acorus calamus* (rhizome) oil vapour cause infecundity in the terminal follicle of the vitellarium among the females of the pulse beetle (Saxena et al., 1976) Tikku et al. (1978) concluded from their studies that *A. calamus* oil has got sterilizing effect on the female of *Trogoderma granarium* Evert. The result reported here are in conformity with the observation made by earlier workers (Khan and Borle, 1985, Charjan and Tarar, 1994)

Table 1-The effect of different doses of *A. calamus* (rhizome) and *C. tigrimum* (seed) powder on seed quality of gram and their bio-efficacy against pulse beetle during storage.

S. N.	Treatment	Increase in number of insect & 500g seed	Percentage infestation (W/w)	100 seed weight (g)	Germination percentage (W/w)	Vigour index
1	<i>A. calamus</i>	10.12	1.90	20.64	73.5	1752
2	<i>A. calamus</i>	5.98	0.80	20.91	81.2	1902
3	<i>A. calamus</i>	3.02	0.15	21.00	89.7	2022
4	<i>A. tigrimum</i>	15.34	3.10	20.44	71.2	1712
5	<i>A. tigrimum</i>	10.14	1.60	20.59	76.0	1771
6	<i>A. tigrimum</i>	5.08	0.63	20.75	85.0	1981
7	Untreated control	110.12	31.34	14.52	38.2	799
	SE ±	15.20	1.55	0.08	0.90	-
	CD at 5%	46.69	4.67	6.25	2.74	-



The data indicated that the infestation percentage of pulse beetle decline with the increase in concentration of *A. Calamus* (rhizome) and *C. tigrimum* (seed) powder. A sharp decline in infestation percentage occurred in seed treated with 0.6% concentration of *A. Calamus* (rhizome) and *C. tigrimum* (seed) powder. The untreated seeds showed highest percentage of infestation. This might be due to the increase in population of pulse beetle. The result are in agreement to those reported by Khan and Borle (1985) and Charjan and Tarar (1994).

The quality parameters viz.100-seed weight, germination percentage and vigor index followed the same trend of infestation percentage . 100 seed weight , germination percentage and vigor index were highest in seed treated with 0.6% concentration of *A. Calamus* (rhizome) and *C. tigrimum* (seed) powder. This might be the least infestation of pulse beetles during storage . the 100 seed weight , germination percentage and vigor index with increasing percentage of pulse beetle (Howe,1972). Since the pulses beetle were eaten off major portion of the endosperm which reduction in weightof the seed was recorded and in turn the affected seed germination and vigor index because of lack of stored food. This is in conformity with the finding of Narayanaswamy (1985)who reported that pulse beetle attack the embryo and germination potential of seed is reduced or totally destroyed.

Khan and Borle (1985) and Charjan and Tarar (1994)reported that the storability of pulse seed could be prolonged without infestation of pulse beetle by treating seed with *A. Calamus* (Rhizome) and *C. tigrimum* (seed)powder. Khan et al. (1982) recorded minimum storage losses in stored sorghum when seed treated with *A. Calamus* rhizome powder @ 0.1% coupled with burning camphor for oxygen deconcentration. Thus , it may be concluded from the result that gram seed treated with *A. Calamus* (Rhizome) and *C. tigrimum* (seed)powder in the proportion of



0.6% can maintain good seed quality and check the population behavior of pulse beetle during storage.

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