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EFFECT OF FUMIGATION WITH CELPHOS ON COTTON SEED VIABILITY AND VIGOUR

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Fuzzy and acid delinted seeds of MCU 9 were fumigated with celphos tablets at a dose level of 3 g and 6 g/tonne of seeds for a period of 24 and 48 hours. The fumigated seeds were stored separately in cloth bag, polythene bag and paper-aluminium foil-polythene-laminated pouch and kept under ambient conditions for 10 months. Irrespective of the dosage and duration, fumigation treatment decreased the viability and vigour of seed during subsequent storage.

Insects play a major role in seed storage. Fumigation is a method to eradicate them. Once the seed storage is completely free of insects, the most serious source of reinfestation is infested seed which is brought in. Seed may be brought from the field already infested, or it may be transferred from an infested storage. However, fumigation, particularly repeated fumigation, may seriously reduce the vigour and even the germination capacity of seeds (Agarwal, 1980). This is particularly true of seeds with a high moisture content. Hence, studies were initiated with MCU 9 to know the effect of fumigation with celphos tablets on seed quality.

MATERIALS AND METHODS

Sufficient quantity of fuzzy and acid delinted seeds of cotton cv. MCU 9 were slurry treated with Captan 75% W.P. @ 2g/kg of seed and then fumigated with celphos (Aluminium phosphide) tablets at the rate of 3 g and 6 g/tonne of seed, for an exposure period of 24 and 48 hours in a fumigation chamber of 3 cubic feet area. Then, the fumigation seeds along with the unfumigated but captan treated control were packed in (i) cloth bag, (ii) polythene bag (700 gauge) and (iii) paper-aluminium foil-polythene laminated pouch at the rate of one kg of seed for each treatment in each container and stored for 10 months. Before and immediately after fumigation and at third, 6th and 10th months of storage, samples were drawn to estimate (i) seed germination (ISTA, 1976) and (ii) seedling length.

RESULTS AND DISCUSSION

Percentage germination and vigour of fuzzy seeds was low when compared with those of acid delinted

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Table 1. Effect of fumigation on germination of fuzzy and acid delinted seeds of cotton cv. MCU-9 stored in cloth bag, polythene bag and P-AF-P pouches at different periods of storage (Angular values of percentages)

	Before	Immediately after	3 months			6 months			10 months		
			CL	Poly	AF	CL	Poly	AF	CL	Poly	AF
						FUZZY SEED					
24th	One Tab (3g)	53.1	45.0	50.8	50.8	36.3	33.3	33.2	34.5	30.0	29.3
	Two Tab (6g)	51.9	43.3	45.0	50.2	37.5	33.2	28.0	38.1	29.3	26.6
48th	One Tab	51.9	42.1	47.9	50.8	36.3	33.2	35.1	38.1	32.0	33.2
	Two Tab	54.3	45.0	47.3	50'8	36.3	33.2	33.2	33.2	30.7	32.0
CONTROL		56.8	56.8	50.8	51.9	53.7	46.7	49.8	51.9	45.0	48.5	50.8
						ACID DELINTED SEED					
24th	One Tab	54.3	53.7	56.8	56.8	45.0	36.3	36.3	43.9	34.5	33 2
	Two Tab	59.3	56.8	56 8	56.8	50.8	33.8	34.5	48.5	34.5	33.2
48th	One Tab	51.3	53.7	60.0	60.0	50.8	38.1	35.1	49.6	36.9	33.2
	Two tab	51.9	50.8	53.7	60.0	46.7	35.1	35 1	36.2	32.0	32.0
CONTROL		58.7	58.7	60.0	62.0	52.0	51.9	58.1	58.7	50.8	58.1	58.1

	Container (C)	Period (P)	Nature of seed (N)	Conc. (Cn)	Duration (D)	PxC	PxN
CD (P=0·05)	3.2	3.2	2.3	3.4	3.9	4.3	4.0
CD (P=0.05)	4.9	4.9	4.9	4.9	5.5		
	(PxCn)	(PxD)	(CxCn)	(CxD)	(CnxD)		

Table 2 Effect of fumigation on the length of seedlings (cm) of both fuzzy and acid delinted seed of cotton cv. MCU 9 stored in cloth bag, polythene bag and P-AF-P pouches at different periods of storage.

	Before	Immediately after	3 months			6 months			10 months		
			CL	Poly	AF	CL	Poly	AF	CL	Poly	CL
					FUZZY SEED						
24th	One Tab (3g)	25.3	22.6	24.2	23.6	17.3	16.3	15.1	16.2	14.5	13.0
	Two Tab (6g)	25.6	22.2	25.4	25.0	18.2	15.3	15.2	17.2	14.0	12.0
48th	One Tab	26.0	22.0	23.1	24.0	18.2	16.2	16.3	15.5	13.2	14.2
	Two Tab	24.5	21.5	23.0	24.0	17.4	14.1	15.3	14.1	12.2	12.5
CONTROL	25.6	25.6	24.1	24.7	25.5	21.3	22.3	23.1	18.2	20.2	22.2
					ACID DELINTED SEED						
24th	One Tab	25.1	23.9	23.6	25.5	20.2	17.2	18.2	18.1	14.5	15.3
	Two tab	24.47	22.3	22.7	24.3	21.3	16.2	18.3	18.2	13.2	15.9
48th	One Tab	25.4	22.2	24.1	24.2	21.1	17.3	17.2	18.2	14.2	14.7
	Two Tab	25.50	21.7	23.7	23.7	17.3	16.2	16.1	17.9	13.7	12.8
CONTROL	25.9	25.9	24.4	23.8	25.2	22.3	23.1	24.2	20.9	21.8	23.1

	Container	Period	Nature of seed	Conc.	Duration	Pxt	PxN
CD (P=0.05)	2.9	2.9	4.2	2.9	1.9	4.0	5.0
	PxCn	PxD	CxCn	CxD	CnxD		
CD (P=0.05)	4.0	5.0	5.0	5.0	5.8		

seeds (Table 1 and 2). This might be due to the heavy initial infestation of pink boll worm (41.5%), the effect of which was eliminated in acid delinted seeds since only sinkers were taken for storage, rejecting the floaters.

Fumigation treatment reduced the viability and vigour of fuzzy as well as acid delinted seeds. The deleterious effect of fumigation was evident immediately after the treatment and it increased with increase in dosage and duration of exposure. The absorbed phosphine gas released from the celphos tablet might have accelerated the free-radical damage causing the degradation of organellar membranes, nucleoproteins, ribosomes and enzymes (Heydecker, 1972), causing and impairment of energy yielding and biosynthetic mechanisms and consequently reduced respiration and biosynthesis in the affected seeds on hydration and concomitantly the seed vigour. Injury to seed due to fumigation depends on the seed moisture content during treatment (Somade, 1955). In the present experiment, the initial seed moisture content was 8.2 per cent

Moisture vapour proof containers like polythene bags and paper aluminium foil pouches are recommended for better seed storage (Krishnasamy, 1982). In the present study, fumigated seeds packed in cloth bag (moisture pervious) recorded higher germination and vigour than moisture vapour proof containers like polythene and paper-aluminium foil-polythene-laminated pouches. However, for non-fumigated seed, moisture vapour proof containers proved superior.

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