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"Locating New Sources of resistance against *s. oryzae* rice weevil in stored sorghum"

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ABSTRACT

In this study taken twenty five sorghum genotypes in which study population build under storage condition from 30 DAS up to 180 days population build up mean calculated for every genotypes which is ranged from 27A (30.17) to 108.33 (P 151). A 27A entry is depicted as minimum adult population amongst all twenty five entries while (P151) showed maximum population amongst all the entries followed by other genotypes. It mean P151 is highly susceptible variety and 27 A is less susceptible variety towards reaction of sitophilus oryzae. Taking up overall mean of all the entries in which minimum germination was recorded in (CS 3541 (47.80%) are maximum was reported in PC 9 (83.70)% while three entries CS 35.41, 27A, P151 showed gradual decline in germination after gap of 30 days which is quite significant and other lines 279A,PC23 SPV125 P311andSPV1015 Can be new source of resistance.

Key words - Screening, Sorghum, Genotypes, Population Buildup, Germination, Resistance.

INTRODUCTION -

Sorghum is main staple crop which used as feed food, fodder and production as a bio ethanol grown world widely. In recent years it has significant value for human being its grain to stored after harvesting for shorter and longer duration other for future consumption or for purpose of seed to next season. However its production is affected by Abiotic and biotic factor after post harvested in which insect pest major attacking the the grain during storage rice weevil *sitophilus oryzae* (L.) is very important serious. Insect pest of many cereals and become severe an sorghum in recent years (Shashi Bala 2020). Due to significant damage during storage it reduced nutritional value. Low percentage of germination, reducing the weight and market value. Rice weevils leads qualitatively and quantitatively deteriorate grain (Goftishu and Belete 2014). It is Important serious pest (*sitophilus oryzae*) of many cereals and reported as severely infestation in sorghum indecent years (Shashi Bala 2023).

Suspectability of stored sorghum to *sitophilus oryzae* has been studied by several workers different sorghum genotypes were reported as variable degree of resistance an different parameter shallu MP 10, 50 varieties from world surghum germplasm C04, C018 and C19 CS H1 CSH8R and 168 based on developing

progeny (Borikar Tayde 1979 Shashi Bala 2023) objective to present study was screening of twenty five sorghum lines for locate different resistance source for developing new sorghum lines against the rice weevil.

Sitophilus oryzae is highly damaged of stored cereals in world (champ & Dyte 1976). Adams (1976) was reported that rice weevil result 18.30% loss in storage Premkishere etal (1975) reported that infestation of rice weevil is detrimental to quality and value of seed. Govt of India is giving main focus on stablising national and inter national butter stocks of food staift with aim to guard against irregularities in production due to vagaries of nature and culete circumtances in which minimize storage loss (Pandyal 2017).

After screening of resistance plants, line their resistance is confirmed by screening their next generation of progeneis under suitable conditions it is availability provides information on heritability of resistance as well. The resistance is confirmed by their testing in different environmental condition like high presure of diseases through multilocation testing. These stable resistance sources were used by breeding program for developing new hybrid varieties / parents , it is sources of new study oninherintance of nutruber genes involved in such program for transfer of effective genes in this method (Thakur 2007).

MATERIAL & METHODS :-

In present investigation were taken twenty five sorghum varieties, CS 3541, AKMS148, AKR150 27A, 27B, RS29, 415A, 415B, CB33, 279A, 279B, 296A, CB11, ICCA 467, UPMC303, CSB21F, MP Chari, PCI PC9, PC23, SPV125, P311, SPV 1015, P37, P151 were screened against to sitophulus oryzae rice weevil to locating new source of resistance against rice weevil.

In this experimentation schedule healthy sound seeds of each variety/ genotype were disinfested by keeping them in freezer at 19^0C temperature for 24 hours and it again conditioned at room temperature before using experiment less than 12% moisture content was kept in seed and each type of seed weighing 100 g m were kept in 500 ml capacity plastic bottle. In every plastic bottle five day old adult weevil were introduced and mouth of each bottle covered with muslin cloth then tightly fixed by rubber bands four these type of sets were kept for one replication. During experimentation scheduled all observation were recorded on different parameter from starting 30 days to 180 days during every month periodically observation were recorded the population build up after storage and seed germination percentage from 30th days to 180 days.

Estimation of seed weight loss –observation percentage of weight loss were recorded by counting number of uninfested seed and number of infested seed weight loss were worked out by using formula (Adamand Schulton1978

Percentage of weight loss =UND – DND

RESULT AND DISCUSSION -

In this trial were taken twenty five genotypes for using as important genetic material for development of future lines, they were screened for their reaction in stored sorghum. Aim of this trial to locate resistance source against s. oryzae in different genotypes all the entries were assed on the following parameters. Table 1 & Table 2.

Record of population buildup Total No adult weevil that emerged from ever bottle seperately were counted and helped in recording the population buildup in every genotype in each care of genotype at monthly intervals starting from 30 DAS and continue upto 6 months of storage.

On population buildup :

- On 30th days after storage expressed by number of adult weevils was minimum in 27A (17.50 adult) followed by P 311 (18.000 adults) and maximum in CS 3541 (61.00 adults) followed by P151 (60.00 adult). rest of entries viz AKMS 148, 279A, ICSA 467, CSBZ1F, PC9, P311 PSV 1015 and P311 recorded cess than 25 adults.
- On 60th days after storage the minimum number of adult were recorded in P311 (21 adult followed by 27A (21.50 adult) and maximum number of adult were observed in P151 (81.00 adult followed by CS 3541 (73.50 adult). Two lines viz 279A and PC9 recorded less than 25 adults rest of other lines ranged from 25.50 to 66.50.
- 90th day after storage minimum number of adult weevils were recorded in 27A (25.50 adult) and maxiumum in P151 (83.50 adults followed by CS 3541 (82.40 adult this was clear indication that increasing adult population in all entries.
- On 120th days after storage the minimum no of adult were observed in 27A and P311 (32.00 adults) and maximum number of adult were observed in P151 (146.50 adult. There was signify increasing the number of emerging adults population build up in most of lines.
- On 150th days after storage number of adult population were observed in 27A (39.00 adults) followed by 279A (41.00 adults) and P311 (42.50 adult) and maximum number of adult population were recorded in (146.50 adults) increase up in number of adult weevils which ranged from 41.00 to 121.50 adults in other lines.
- On 180th days after storage adult population was minimum in 27A (46.50 adults) and maximum in P151 (181.50 adults) interest of entries number of adult weevils ranged from 51 to 146.50.
- In present study over all means in all entries of genetic material as regards to population build up expressed in number of adult ranged from 30.17 to 108.33 adults.
- The entry 27A amongst all entries depicted minimum number population build up and P151 showed maximum number of population amongst entries Population build up expressed in the form of numbers of adult weevils those were ranged from 30.17 to 108.33 amongst all the entries 27A showed minimum population build up and P151 expressed maximum number of population amongst all entries it is means indicate that viability of seed in different entries during the

germination maximum percentage of germination was recorded in PC 9 (83.70%) followed by others and minimum was recorded in CS 3541 (47.80%) other different three entries CS 3541m 27A, and P151 showed gradual decline in percentage of germination after each gap of 30 days those are quite significant in this trail clearly indicated that promising genetic material in lines against sitophilus oryzae entries like 279A, PC 23, SPV 125, P311 and SPV 1015 can be new power source of resistance against in sitophilus oryzae for developing future lines. Table 1.

TABLE 1 - SCREENING OF GENETIC MATERIAL AGAINST SITOPHILUS ORYZAE

Number of Adult Weevils days after storage								
S.N.	**Genotypes**	**30**	**60**	**90**	**120**	**150**	**180**	**Mean**
1	CS3541	61.00 (7.84)	73.50 (8.60)	82.50 (9.11)	97.00 (9.87)	121.50 (11.04)	146.50 (12.12)	97.00
2	AKMS148	23.50 (4.90)	26.50 (5.19)	36.50 (6.08)	44.00 (6.67)	53.50 (7.35)	61.00 (7.84)	40.83
3	AKR150	26.00 (5.15)	31.50 (5.65)	38.50 (6.24)	47.50 (6.93)	54.50 (7.42)	65.50 (8.12)	43.67
4	27A	17.50 (4.24)	21.50 (4.69)	25.50 (5.10)	32.00 (5.70)	39.00 (6.28)	46.50 (6.85)	30.17
5	27B	25.00 (5.05)	29.00 (5.43)	39.00 (6.28)	46.00 (6.82)	57.00 (7.58)	65.50 (8.12)	43.58
6	RS29	51.50 (7.21)	66.50 (8.18)	77.50 (8.83)	86.00 (9.30)	92.50 (9.64)	121.50 (11.04)	82.58
7	415A	52.00 (7.25)	56.50 (7.55)	67.50 (8.25)	83.50 (9.16)	96.50 (9.85)	124.00 (11.16)	80.00
8	415B	55.50 (7.48)	61.00 (7.84)	66.00 (8.15)	81.00 (9.03)	97.50 (9.90)	120.00 (10.97)	80.17
9	CB33	37.50 (6.16)	41.00 (6.44)	46.00 (6.82)	52.50 (7.28)	66.50 (8.18)	72.50 (8.54)	52.67
10	279A	21.00 (4.64)	24.00 (4.95)	29.00 (5.43)	34.50 (5.92)	41.00 (6.44)	51.00 (7.81)	33.42
11	279B	26.50 (5.19)	29.00 (5.43)	35.50 (6.00)	42.50 (6.55)	51.00 (7.18)	57.50 (7.62)	40.33 (6.39)
12	276A	35.00 (5.96)	43.50 (6.63)	54.00 (7.38)	64.50 (8.06)	66.50 (8.18)	86.50 (9.38)	58.33
13	CB11	41.50 (6.48)	49.00 (7.04)	57.50 (7.62)	76.50 (8.77)	85.50 (9.27)	92.00 9.70()	67.0
14	ISCA467	21.50 (4.69)	26.50 (5.19)	33.50 (5.82)	40.00 (6.36)	45.50 (6.78)	56.00 (7.52)	37.17
15	UPMC503	26.00 (5.15)	29.00 (5.43)	34.50 (5.92)	41.00 (6.44)	47.00 (6.89)	55.50 (7.48)	38.83
16	CSB21F	21.50 (4.69)	26.50 (5.19)	32.00 (95.70)	39.00 (6.28)	46.00 (6.84)	52.50 (7.28)	36.25
17	MPCHARI	35.50 (6.00)	40.00 (6.36)	50.00 (7.10)	63.00 (7.97)	69.00 (8.34)	76.50 8.77()	55.67
18	PC-1	34.50 (5.92)	43.50 (66.3)	59.00 (7.71)	77.00 (8.80)	81.00 (9.03)	85.50 (9.27)	63.42
19	PC-9	22.50 (4.80)	24.50 (5.00)	29.00 (5.43)	49.00 (7.04)	54.00 (7.38)	59.00 (7.71)	39.67
20	PC23	37.50 (6.16)	46.00 (6.82)	52.50 (7.28)	65.50 (8.12)	73.00 (8.57)	87.00 (9.35)	60.25
21	SPV125	25.50 (5.10)	29.00 (5.43)	33.50 (5.83)	49.00 (7.04)	55.50 (7.48)	68.00 (8.28)	43.42
22	P311	18.00 (4.30)	21.00 (4.64)	25.50 (5.10)	32.00 (5.70)	42.50 (6.55)	51.00 (7.18)	31.50
23	SPV1015	21.50 (4.69)	25.50 (5.10)	32.00 (5.70)	41.00 (6.44)	46.50 (6.85)	51.50 (7.21)	36.33
24	P37	22.50 (4.79)	29.00 (5.43)	34.50 (5.92)	41.50 (6.48)	49.00 (7.04)	56.00 (7.52)	38.75
25	P151	60.00 (7.78)	81.00 (9.03)	83.50 (19.16)	97.50 (9.90)	146.50 (12.12)	181.50 (13.53)	108.33
Sem+	1.10	0.12	0.11	0.11	0.12	0.10	0.42	1.6
CD at 5%	0.46	0.41	0.44	0.43	0.46	0.40	1.66	4.9

Figures in Parenthesis Square root +0.5 value.

Seed germination % after the completion of observation seed of each genotype was subjected to test of germination with the help of rolled paper towel test as per international rules of seed testing (Anonymous 1996). The Data on six month of storage records were maintained of germination data at monthly intervals.

Seed germination % days after storage :-

- On 30th days after storage % of germination was minimum in entry 415A (59.55%) and maximum in PC 9 (93.00). In all other lines ranged from 60.00% (CS 3541) to 91.50% (279B) in general the fodder lines amongst genetic material showed more germination in 30 days other storage.
- On 60th days after storage the minimum generation was in 415A (54.50%) followed by CS 3541 (56.10%) and maximum germination was recorded in PC (89.50%) the germination in other lines ranged from 56,.50% to 88.00% SPV (125).
- On 90th days after storage the minimum generation was observed in entry 415A and maximum generation was recorded in PC9 generation different entries.
- On 120th days after storage minimum germination was recorded in 415A (42.50%) followed by CS 3541 (47.50%) and maximum generation was recorded in 27A (82.00%) followed by PC (81.5) the germination percentage in other lines ranged from 51.50% (CB 11) to 77.00% SPV (125).
- On 150th DAS minimum germination was recorded in 415A (39.00%) and maximum was reported in PC9 (77.00%) followed by 27A. (76.50%). There was day decline of germination in most of entries.
- On 180th days after storage minimum germination was recorded in 415A (30.00 %) followed by CS 354) (31.00) and P(151) 35.50%) the maximum germination was recorded in 27A7150%) in other entries it ranged from 49.00% (CB33) to 69.00% SPV 125.
- In theses observation taking the overall means of all entries was general decline in germination the minimum germination was recorded in CS 354 (47.80%) and maximum was in PC 9 (83.70%). Three entries viz 27A and P151 showed gradual decline in germination in each gap of 30 days in which is quite significant.
- In this trial twenty five sorghum variety were screened against pest and observation were recorded on population build up on different day and considered to divide susceptibility of sorghum genotypes against S oryzae in different and maximum seed germination percentage were recorded in different sorghum lines. The susceptibility of some sorghum genotypes to sitophilus oryzae has been reported past (Adams 1976) Adetunji 1988 they were response in there lines to different damage parameters

entry like JS 20 (samuel) & Chatterjee 1953) C 018, C04, C019 (Doraiswamy etal 1976) were identified as relatively less suspectible to s. oryzae.

References -

1. Adetunji J.F. 1988. A Study of resistance of same sorghum seed cultivar to *sitophilus orzyae (L)* coleoptera : Curculionidee) stored product res. 24, 67-71.
2. Adams J.M. (1976) weight loss caused by development of *S. oryzae.* Journal of stored production research 12: 269-272.
3. Borikar, Tayde DS 1979 : Resistance in sorghum to *sitophilus oryzae (Lin)* proc. Indian Acad Sci. Bull. 28: 273-76
4. Champ B.R. Dyte C.E. (1976) Global survey of pesticides susceptibility of stored grain pest FAO plant protection science, No. 5 FAO, ROME.
5. Goftishu M.S. Belete (2014) susceptibility of sorghum to maize weevil *sitophilus zeamais* motschulsky (coleoptera curculianisda) Africur Journal of Agricultural Research 9 (31) 2419-2426.
6. Kishore, P. Jotwani M.G. and Sharma G.C. 1975; reaction of some newly developed varieties and hybrid of sorghum to Insect attack in storage Indian Journal of Ent. 37 (419-420).
7. Shashi Bala (2016) Ecofriendly management of sitophilus orzyae reaction of sorghum genotypes to rice weevil *sitophilus oryzae* J. Res 40 (379-81)
8. Shashi Bala (2023); evaluation of promising sorghum lines with wide gene pool for locating new sources of resistance against rice weevil *sitophilus oryzae.* J. ent. Res. 47(i) : 71-756.
9. Samuel CK and Chatterjee S. 1953. Studies on varietal resistance and susceptibility of Jowar (Andropogan Sorghum) to storage pest in India. Indian J. Ent. 15 : 225-39.
10. Thakur RP Reddy BV mathur K. Screening techniques for surghum disease. In formation bulletin No. 76 Patancheru 502 324 Andhra Pradehs. India international Crop. Research Institute of Semi Anid Tropics 2007.

TABLE 2 - SCREENING OF GENETIC MATERIAL AGAINST *SITOPHILUS ORYZAE*

		Number of Adult Weevils days after storage						
S.N.	**Genotypes**	**30**	**60**	**90**	**120**	**150**	**180**	**Mean**
1	CS3541	60. (51.05)	56.50 (48.73)	52.50 (46.43)	47.50 (43.56)	39.00 (38.64)	31.00 (33.83)	47.8
2	AKMS148	81.50 (64.53)	77.50 (61.68)	72.50 (58.37)	66.50 (54.63)	63.0 (52.53)	59.00 (50.18)	70.00
3	AKR150	74.50 (59.66)	70.5 (57.10)	67.00 (54.93)	62.50 (52.23)	56.5 (48.73)	51.50 (45.85)	63.70
4	27A	91.50 (73.10)	89.00 (70.64)	85.50 (67.61)	82.0 (64.09)	76.5 (61.00)	71.50 (57.73)	82.70
5	27B	82.50 (65.26)	77.00 (61.34)	73.50 (59.01)	67.00 (54.93)	61.00 (51.35)	55.50 (48.15)	69.40
6	RS29	89.50 (71.09)	85.5 67.61()	80.50 (63.79)	72.00 (58.05)	66.00 (54.33)	51.50 (48.15)	69.40
7	415A	59.00 (50.18)	54.50 (47.58)	51.00 (45.75)	42.50 (40.68)	36.50 (37.16)	30.00 (33.21)	45.60
8	415B	82.50 (65.26)	77.50 (61.68)	71.00 (57.41)	63.00 (52.53)	57.00 (49.02)	52.50 (46.43)	67.30
9	CB33	81.50 (64.52)	75.5 (61.68)	71.50 (57.73)	64.00 (53.12)	53.50 (47.00)	59.00 (44.42)	65.80
10	279A	90.00 (71.56)	87.5 (69.29)	82.50 (65.26)	77.50 (61.68)	73.00 (58.69)	68.00 (55.85)	79.80
11	279B	91.50 (73.10)	87.50 (69.29)	81.00 (64.16)	75.50 (60.33)	73.00 (58.69)	66.00 (54.33)	79.10
12	276A	87.00 (68.87)	83.50 (66.03)	78.50 (62.37)	72.50 (58.37)	66.00 (54.33)	61.50 (51.64)	74.80
13	CB11	65.50 (54.02)	61.00 (51.35)	57.00 (49.02)	51.50 (45.85)	46.50 (42.99)	44.50 (41.84)	54.30
14	ICSA467	89.50 (71.09)	84.50 (66.81)	80.50 (63.79)	72.50 (58.37)	67.50 (55.24)	62.00 (51.94)	76.10
15	UPMC503	87.50 (69.29)	84.00 (66.42)	79.00 (62.72)	74.00 (59.34)	65.50 (54.02)	61.00 (51.35)	75.20
16	CSB21F	89.00 (70.64)	86.50 (68.44)	81.00 (64.16)	78.00 (62.02)	72 (58.37)	68.00 (55.54)	79.20
17	MPCHARI	91.00 (72.56)	87.50 (69.29)	83.50 (66.03)	76.50 (61.00)	65.50 (54.02)	57.50 (49.31)	76.90
18	PC-1	88.50 (70.17)	82.50 (65.26)	78.00 (62.02)	69.00 (56.16)	65.50 (54.02)	61.00 (51.35)	74.10
19	PC-9	93.00 (74.69)	89.50 (71.09)	86.50 (68.44)	81.50 (64.52)	77.00 (61.34)	74.50 (59.66)	83.70
20	PC23	89.00 (70.64)	82.50 (65.26)	77.00 (61.34)	71.50 (57.73)	62.50 (52.23)	56.50 (48.73)	73.20
21	SPV125	90.5 (72.09)	88.00 (69.72)	83.50 (66.03)	77.00 (61.34)	73.50 (59.01)	69.00 (56.16)	80.30
22	P311	87.00 (68.87)	82.00 (64.90)	76.50 (61.01)	6.50 (61.06)	64.00 (53.13)	59.00 (50.18)	74.20
23	SPV1015	91.00 (72.56)	86.50 (68.44)	82.00 (64.90)	72.50 (58.37)	67.50 (55.24)	62.50 (52.23)	77.00
24	P37	87.50 (69.29)	82.50 (65.26)	75.50 (60.33)	72.00 (58.05)	59.00 (50.18)	56.50 (48.73)	72.20
25	P151	87.00 (68.87)	79.00 (62.72)	75.00 (60.00)	63.50 (52.83)	55.50 (48.15)	34.50 (35.97)	65.80
Sem+		0.83	0.49	0.53	0.67	0.54	0.52	
CD at 5%		3.29	1.92	2.11	2.63	2.11	2.05	

Figures in Parenthesis are arcsine transformed values.