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esearch Notes

Management of seed borne grain mould disease of sorghum with botanicals

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In semitropical areas like Africa and Asia, he poor man's crop *viz.* sorghum (*Sorghum icolor* (L.) Moench) has been grown for grain s well as for forage. India has the largest hare in (32.3%) world area in sorghum and anked second in production after USA. An utstanding characteristics of sorghum is its bility to produce grain under conditions too evere particularly in dry conditions. Good seeds re a symbol and a foundation of good agriculture.

Grain mould is one of the most widespread nd devastating diseases of sorghum and ranks umber one, primarily because, it concerned vith the quality of seed/grain (Frederiksen, 1982). The more pathogenic field fungi that seriously damage seed/grain in sorghum are primarily *Fusarium monilifome* and *Curvularia lunata* (Castor and Frederiksen, 1982).

The physical, physiological and biochemical changes that occur in seed due to grain mould infection are discolouration of earhead and individual grains, viability of seeds was reduced (Narasimhan and Rangaswamy, 1969), vigour of seedlings was reduced, reduction in the content of total sugars, reducing sugars and non reducing sugars (Williams and McDonald, 1983), rapid decrease of starch, the increase in phenolics due to infection (Farkas and Kiraly, 1962) and changes in protein content of seeds.

Scientific name	Parts used	Common name	Family
Adenocalyma alliaceum	Leaf	Garlicrine	Bignoniaceae
Allium sativum	Bulb	Garlic	Alliaceae
Azadirachta indica	Leaf	Neem	Meliaceae
Bougainvillea spectabilis	Leaf	Bougainvillae	Nyctaginaceae
Mentha arvensis	Leaf	Mint	Lamiaceae
Catheranthus roseus	Leaf	Peri winkle	Myrtaceae
Ocimum sanctum	Leaf	Thulsi	Labaceae
Prosopis juliflora	Leaf	Seemai karuvel	Mimosaceae
Vitex negundo var. *purpurascens*	Leaf	Notchi	Verbanaceae

Biological control of plant pathogens using plant products is another vital area of plant pathological research in the present day to avoid environmental pollution. Green plants act as the reservoirs of effective chemotherapeutants and are constituents of inexhaustible source of harmless pesticides (Swaminathan, 1978). It will reduce the cost of production and helpful to poor farmers in particular.

The extracts of nine plant species were collected for evaluating their antifungal activities against seed borne pathogen of sorghum. The list of plant species used are given in the following table.

The plants extract was prepared by the following method: Fresh leaf/bulb materials of plant species were used for extraction. They were first washed with distilled water, then ground in a pestle and mortar by adding sterile water at the ratio of 1:1 w/v and filtered through muslin cloth. This formed the standard plant extract solution (100%). The above extracts were diluted to 10% by adding sterile water. The plant extracts so prepared were filter sterilized.

Sorghum cv. CO 26 seeds were soaked in the plant extracts for 6 hrs at the ratio of 1:06 (seed:solution). Then, the soaked seeds were dried under shade. They were tested for their health by blotter paper method, the unsoaked seeds served as control. Observations for the incidence of seed borne pathogens were made under a stereobinocular microscope and percentage of infection was calculated.

From the laboratory study, four superior plant products such as *Adenocalyma alliaceum*, *Allium sativum*, *Prosopis juliflora* and *Azadirachta indica* selected for field study to know the efficacy of these botanicals on control of field incidence of grain mould disease. The treated seeds along with control were sown in the field during Feb. 2002 in randomized block design with four replications adopting the spacing of 45x20cm. The plot size was 4x3m^2. The count on field emergence was taken and calculated the percentage of field emergence. Five seedlings plot were uprooted and dried in a hot air oven maintaining at 85°C for 24h and drymatter production was recorded. Then vigour index was calculated using the following formula (Abdul Baki and Anderson, 1973).

VI = Germination (%) x Drymatter production

Biometric characters like plant height (cm) boot leaf length (cm) and panicle length (cm) were measured in randomly selected five plants plot. The earheads were observed for grain mould disease incidence and percentage of infection was calculated. After harvesting and threshing the seed yield per plot and hectare was recorded. The data from the experiments were analysed statistically as per the method prescribed by Panse and Sukhatme (1985).

In laboratory test, all the leaf extract significantly reduced the mycelial growth of pathogen to varying degrees. Among them *Adenocalyma alliaceum*, *Prosopis juliflora*, *Allium sativum* and *Azadirachata indica* recorded minimum fungal growth of 12.15 per cent, 16.10 per cent, 22.20 per cent and 30.22 per cent, respectively than control (60.25 per cent) (Table 1). Whereas *Vitex negunda* showed maximum infection (56.3 per cent). The antifungal properties of above

Table 1. Effect of botanicals on seed borne pathogen (*Alternaria* sp., *Curvularia* sp.) of sorghum

Seed treatments	Pathogen infection (%)
Control	60.25
Adenocalyma alliaceum leaf extract	12.15
Prosopis juliflora leaf extract	16.10
Azadirachta indica leaf extract	30.22
Ocimum sanctum leaf extract	35.27
Mentha arvensis leaf extract	42.31
Bougainvillea spectabilis leaf extract	45.39
Catheranthus roseus leaf extract	51.35
Vitex negundo var. *purpurascens* leaf extract	56.32
Allium sativum bulb extract	22.20
SEd	4.37
CD (P=0.05)	9.11

Table 2. Effect of botanicals on field emergence (%) and vigour index in sorghum

Seed treatments	Field emergence	DMP (g/5 seedlings)	Vigour index
Control (Unsoaked seeds)	87	2.0	174
Adenocalyma alliaceum leaf extract	95	3.0	285
Prosopis juliflora leaf extract	98	3.5	343
Azadirachta indica leaf extract	93	2.7	251
Allium sativum bulb extract	91	2.4	218
SEd	1.9105	1.000	3.2288
CD (P=0.05)	4.0722	0.235	6.8820

plant extracts were well documented (Tewari and Nayak, 1991). Shekhawat and Prasada (1971) reported that spore germination of *Alternaria tenuis* was inhibited by cold water leaf extract of *Prosopis specifera, Allium cepa, Allium sativum*. Spore germination of *Helminthosporium* spp. was inhibited by leaf extracts of *Allium sativum* and *Curvularia penniseti* was inhibited by *Ocimum sanctum* leaf extract.

Du and Francis (1975) reported that scordine present in the garlic bulb possess fungicidal activity. Neem leaves contain nimbin and nimbinene which shows fungicidal activity (Dakshinamurti, 1954).

In the field study, maximum field emergence 98 per cent) was recorded by *Prosopis juliflora* leaf extract treated seeds which was on par with *Adenocalyma alliaceum* (95%). Seeds soaked in *Prosopis juliflora* leaf extract excelled others in producing vigourous seedlings which recorded maximum vigour index (343). in this experiment, the plant height (151.2 cm), boot leaf length (47.0 cm), panicle length (32.0 cm) and seed yield (3438 kg ha^{-1}) were also highest, which was followed by *Adenocalyma alliaceum* (Table 2 and 3). Similar results were reported by Jegathambal (1996) in sorghum.

Significant differences were noticed in percentage of grain mould incidence due to plant extract soaking treatments. *Prosopis juliflora* leaf extract treated seeds showed its superiority in checking grain mould incidence (5.22%) which was followed by *Adenocalyma alliaceum* (12.12%). The control treatment recorded maximum percentage of grain mould incidence (45.25%) (Table 4). Inhibitory action of *Prosopis juliflora* on mycelial growth of *Pyricularia grisea* in rice was reported by Kamalakannan *et al.* (2001). Saravanan (1999) suggested that maximum inhibition of spore germination of mould pathogen was registered by *Catheranthus roseus* and *Prosopis*

Table 3. Influence of botanicals on seed yield and its components in sorghum

Seed treatments	Plant height (cm) at maturity	Boot leaf length (cm)	Panicle height (cm)	Yield	
				per plot	per hectar
Control	139.0	39.8	26.1	3.66	3050
Adenocalyma alliaceum leaf extract	145.0	44.3	30.1	3.90	3250
Prosopis juliflora leaf extract	151.2	47.0	32.0	4.12	3438
Azadirachta indica leaf extract	143.5	42.5	28.2	3.90	3200
Allium sativum bulb extract	142.7	41.1	27.3	3.76	3125
SEd	2.3447	2.0936	NS	0.010	62.50
CD (P=0.05)	4.9977	4.4625		0.200	125.00

Table 4. Influence of botanicals on sorghum grain yield

Seed treatments	Grain mould infection (%)
Control	45.25
Adenocalyma alliaceum leaf extract	10.12
Prosopis juliflora leaf extract	5.22
Azadirachta indica leaf extract	13.19
Allium sativum bulb extract	17.17
SEd	1.2646
CD (P=0.05)	2.7553

juliflora. *Prosopis* leaf powder extract (10%) reduced the sheath rot incidence and intensity and increase grain yield of rice.

Shukla and Misra (1981) identified two new glycosides *viz*. Kaemferol 4-methylether, 3-OB-D galacto pyranoside and retusin 7-0 eohesperidosite from the leaf extract of *Prosopis juliflora*. Glycosides are the precursors of lignifications which will retard the fungal growth. This study revealed that, 10 per cent leaf extract of *P.juliflora* could be used for seed soaking (6h) to control the grain mould incidence of sorghum. The plant extract from *P. juliflora* is not harmful to human and animals.

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tandardisation of the age of rootstocks for top wedge grafting in amarind (*Tamarindus indica* L.)

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Top wedge grafting is done on linearly rowing fresh terminal shoot of the rootstock ith the advancement of age naturally the growth arameters of the seedling increases. The height f grafting may thus exerts an influence on ie success and subsequent growth parameters f the seedling increases. The height of grafting ay thus exerts an influence on the success nd subsequent growth of scion portion. As ie maintenance of the seedling for longer duration icur additional maintenance costs, there is need investigate an appropriate rootstock age for aximum success. In view of this the present vestigation was taken up at University of gricultural Sciences, Dharwad during 000-01.

Polythene bags of 400 gauge thickness nd size of 20x10cm were used for raising ootstocks. Potting mixture containing red earth, rmyard manure (FYM and coir dust in 1:1:1 /v]) was used. Selected healthy, large sized eeds were sown flat on the medium at a shallow death. Seeds were sown in polybags during the first week of every month from March to September, so that seedling of different age groups was available at one time for grafting *i.e.* during January. Scions from the clone Dharwad Tamarind Selection-1 (DTS-1) were collected in the morning hours (8.00 to 9.00 am) on the day of grafting and defoliated with sharp secateur. The scions so prepared were further used for grafting on the same day without curing. For the top wedge grafting, the top growth of the rootstock was decapitated with a sharp knife or secateur. Then a longitudinal cut of 5 cm length was given from the terminally pruned rootstock. A scion shoot of same thickness and length of about 8 to 10cm was selected and the cut end of the scion was mended into a wedge shape of 5-6cm long by chopping of the bark and a little portion of wood from two opposite sides, care was taken to retain some bark on the remaining two sides. The wedge of the scion was inserted in to the cleft of the stock plant taking care that the