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EFFECT OF PROANTHOCYANIDINS AND FLAVONES ON The GERMINATION OF *SORGHUM VULGARE* PERS. SEEDS

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Effect of natural proanthocyanidins and synthetic flavones on the germination of *Sorghum vulgare* Pers. was studied. Both the groups of flavonoids promoted the germination. Higher concentrations inhibited the seed germination.

Keywords : Proanthocyanidins; Flavones; Seed germination.

Phenolic compounds are important secondary metabolites in plants. Several phenolic compounds are known plant growth regulators (Letham, 1978; Harborne, 1980). Literature is slowly accumulating regarding the germination regulation by phenolics. Mayer and Poljakoff-Mayber (1963) found salicylic, gallic, ferulic, and p- coumaric acids as germination inhibitors. Van Sumere *et al.*,(1972) found caffeic, O-coumaric, β resyclic, chlorogenic, acids and phenol inhibiting the germination of lettuce and barly seeds. They also found caffeic, p-hydroxy benzoic and syringic acids and esculetin as germination promoting substances. Gentisic, salicylic and chlorogenic acids were also found to inhibit the germination of *Atriplex triangularis* (Khan and Ungar, 1986).

Pronathocyanidins and flavones are important flavonoid group of phenolics and they are prolific in occurrance in plant kingdom. The present study aims at finding out the effect of these two group of phenolics on the germination.

Sorghum vulgare pers Var. 2219B seeds were procured from All India Coordinated Sorghum Improvement Project (AICSIP), Rajendranagar, Hyderabad. The extraction and isolation of leucocyanidin from the seed testa of *Tamarindus indica* Linn., Procyanidins from the unripe fruits of *Phoenix sylvestris* Roxb. and *Anona squamosa* Linn., propelargonidin from the stem bark of *Cassia javanica* Linn., and *Peltophorum pterocarpum* (DC) Backer ex. Hyene, prorobinetinidin from the stem bark of *Acacia leucophloea* Linn. proanthocyanidins from the stem bark of *Xylia dolarbriformis* Benth. and roots of *Dichrostachys cinerea* (Linn.) Wright & Arn were done as described by Rao *et al.*, (1980; 1980a).

The seeds were surface steralized with 0.1% mercuric chloride and washed thoroughly with several changes of distilled water. One hundred seeds were distributed in each 15 cm petriplate provided with Whatman No. 1 filter paper. Each compound was tested at 5 concentration levels viz. 1, 5, 10, 20

TABLE 1

EFFECT OF PROANTHOCYANIDINS ON THE GERMINATION OF SORGHUM VULGARE SEEDS

Compound	% seed germination*					% germination over control				
	1.0 ppm	5.0 ppm	10 ppm	20 ppm	50 ppm	1.0 ppm	5.0 ppm	10 ppm	20 ppm	50 ppm
Leucocyanidin	36	58	52	43	-	108	175	157	132	-
Procyanidin from *P. sylvestris*	50	59	39	20	-	151	179	118	61	-
Procyanidin from *A. squamosa*	34	39	46	14	3	104	118	139	43	9
Propelargonidin from *C. Javanica*	48	50	41	28	-	146	151	125	85	-
Propelargonidin from *P. pterocarpum*	37	43	40	29	4	112	129	121	86	12
Prorobinetinidin	35	44	26	15	3	107	132	78	46	9
Proanthocyanidin from *X.dolarbri-formis*	37	39	19	12	4	112	119	59	37	12
Proanthocyanidin from *D. cinera*	40	47	43	27	-	121	144	130	82	-
CONTROLS						33				

* Each value represents the mean of three replicates.

TABLE 2

EFFECT OF FLAVONES ON THE GERMINATION OF *SORGHUM VULGARE* SEEDS

Compound	Percentage of germination					+,Percent germination over control				
	1.0 ppm	5.0 ppm	10 ppm	20 ppm	50 ppm	1.0 ppm	5.0 ppm	10 ppm	20 ppm	50 ppm
7-Hydroxy flavone	40	47	42	38	16	121	142	127	115	48
5, 7-Dihydroxy flavone	42	59	49	36	11	127	179	148	109	33
7-Hydroxy-3-methyl flavone	50	36	26	11	3	151	109	79	33	9
5, 7-Dihydroxy-3-methyl flavone	46	56	40	84	8	139	169	121	72	24
5, 7-Dimethoxy flavone	41	49	47	34	15	124	148	142	103	45
7, 3', 4', 5'-Tetramethoxy-3-methyl flavone	35	42	48	28	6	106	127	145	85	18
7-0-Carboxy methyl-3-methyl-3', 4'-dimethoxy flavone	34	42	55	26	-	103	127	167	79	-
7-0-Carboxy methyl-8-formyl flavone	36	47	39	31	12	109	142	118	94	36
7-Allyloxy-3', 5'-trimethoxy flavone	44	54	58	27	4	130	164	176	82	12
7-Propargyloxy-5-hydroxy flavone	34	38	42	30	13	103	115	127	91	39
5,7-Dibenzoyloxy flavone	36	40	31	14	-	109	121	94	42	-
Control						33				

* Each value represents the mean of three replicates.

and 50 ppm. 10 ml test solution was poured in petri plate. A water control was also maintained. The plates were kept in dark at 25±1°C. The germination was recorded after 48 hours. Emergence of radicle was taken as criterion for germination. The results in terms of percent germination and percent germination over control are shown in Table 1 (Proanthocyanidins) and Table 2 (flavones).

All the proanthocyanidins and flavones were found to be germination promoting. Among the proanthocyanidins, procyanidin from *P. sylvestris* (79% over control at 5 ppm) and leucocyanidin (75% over control at 5 ppm) were found to be most effective. Similarly in case of flavones 5,7-dihydroxy flavone (79% over control at 5 ppm), 7-allyloxy-3',4',5'-trimethoxy flavone (76% over control at 10 ppm) and 5,7-dihydroxy-3-methyl flavone (69% over control at 5 ppm) were most effective germination promoters. At higher concentrations all the compounds inhibited germination.

Evenari (1949) suggested that several growth promoting compounds also acts a germination regulators. In earlier studies, proanthocyanidins (Shantz and Steward, 1955, Rao *et al.*, 1980) and flavones (Rao and Rao, 1987) were proved to be growth promoting. The proanthocyanidins which promoted the seed germination to the maximum extent were also found to promote the growth of *Lemna* to maximum extent (Rao *et al.*, 1980). Similarly flavones which caused maximum germination were earlier proved to be most effective growth stimulators (Rao and Rao, 1987). Thus there is a good correlation between growth promotion and germination promotion caused by proanthocyanidins and flavones.

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