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SHORT COMMUNICATION

SEED EMERGENCE CAPACITY FROM DIFFERENT DEPTHS IN SORGHUM GENOTYPES AND ETHYLENE PRODUCED BY THE SHOOT APICES

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Production of ethylene in long and short mesocotyl varieties of sorghum was measured at different phases of seedling growth. Seedlings which had to emerge out from the deeper depths, showed presence of less amount of ethylene as compared to those which were sown nearer to the surface or in petridishes. Genotypes having short mesocotyl produced significantly higher amount of ethylene than those with long mesocotyl.

One of the major factors responsible for poor crop establishment in sorghum is irregular depth of sowing. Genotypes germinating from deeper depths have longer mesocotyl. The causal mechanism for some varieties to emerge from deeper depths and having longer mesocotyl is not yet known. The object of this work is to see whether ethylene and IAA have any involvement with the seedling emergence.

Sorghum varieties IS-301 and IS-13 (long mosocotyl) and IS-5469 & IS-4542 (short mesocotyl) were germinated at depths of 5 and 10 cms in pots kept in glass house with full air ventillation, 17% to 22% relative humidity and minimum and maximum temperature of 19° to 39°C, Pots were irrigated only on first day to saturation. Sampling of seedlings for ethylene estimation was done at 24, 48, 84 132 hours after sowing. Plumule part of seedling was taken into vaccutainers and homogenised to liberate ethylene and 0.5 ml of gas was taken out from the vaccutainer. injected into the Gas Chromatograph set at NTP.

At 24 hours after sowing, when only radicles had emerged out (Table I), only IS—301 which germinated in petridishes showed traces (0.0004 nanomoles) of ethylene per plumule. At 48 hours after sowing, when both radicle and plumule had emerged ethylene production was more but the genotype differences were negligible except in IS—301 which showed a higher amount of ethylene. Seedlings grown in petridishes showed highest amount of ethylene. Under stress at 10 cms, plant showed even less ethylene than at 5 cms. This suggests that ethylene evolution is under least mechancial stress. At 84 hours after sowing, when plumule of short mesocotyl variety of sorghum had emerged from the soil, it was found that seedlings belong-

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ing to differentty pes were producing significantlys imilar amounts of ethylene whether they emerge from 5 or 10 cm depths, except in IS—13 (long mesocotyl) where the mesocotyl emerging from 5 cm depth, had less ethylene (0.013 nano moles) than the seedlings sown at 10 cm (0.027 nanomoles) depths. Amount of ethylene in short mesocotyl genotypes was significantly higher than in long mesocotyl. At 132 hours all seedlings had fully emerged from their respective depths. Both the genotypes of short mesocotyl have shown nearly 3 to 5 times more ethylene production than the long types.

Table I. Presence of ethylene and IAA in plumules of sorghum at different phases of seedling germination from various depths in soil

Varieties	Depth of sowing	Nanomoles of ethylene/plumule after				IAA/seedling in μg
		24 hr	48 hr	84 hr	132 hr	
Short Mesocot	In petridish	Nil	0.022	0.095	0.165	2.50
IS—5469	5cm in soil	Nil	0.68	0.012	0.153	5.00
	10cm in soil	Nil	0.006	0.067	0.123	5.20
IS—4542	In petridish	0.0004	0.013	0.089	0.161	2.25
	5cm in soil	Nil	0.007	0.069	0.154	4.84
	10cm in soil	Nil	0.003	0.069	0.132	4.89
Long Mesocot	In petridish	Nil	0.024	0.055	0.077	3.00
IS—301	5cm in soil	Nil	0.019	0.051	0.058	5.50
	10cm in soil	Nil	0.010	0.051	0.051	5.90
IS—13	In petridish	Nil	0.007	0.013	0.058	3.65
	5cm in soil	Nil	0.008	0.014	0.043	6.00
	10cm in soil	Nil	0.006	0.027	0.033	6.13

IAA from plumule apices was extracted with peroxidase free diethyl ether at 0°C temperature. Nonacidic and acidic fractions were separated. IAA was estimated from acidic fraction. Gordon and Webber's (1951) reagent was used (Salkowski reaction) and readings were taken in Spectronic-20 at 530 nm. IAA estimation was done from the seedlings right after their emergence from the soil. Genotypes having short mesocotyl had slightly less IAA than those having long mesocotyls. Moreover, there seems to be a trend that when ethylene liberation is more there is comparatively less amount of IAA in the plumule.

Stress and injury influences ethylene production. Goeschl *et al.* (1966), demonstrated that when apices encounter interferences with their growth through the soil, a large burst of ethylene production occurs, which serves to restrict stem tip into a tighter hook and causes a swelling of stem which strengthens the seedling's ability to emerge from the soil. But results presented here do not agree with the above find ings. However, production of ethylene increased first five days of seedling growth. Ethylene production can be from the auxin conversion into ethylene as suggested by Burg and Burg (1966) was also considered. There seems to be a correlation between ethylene production and IAA, because where stress faced was less, there was less IAA but more ethylene in all four genotypes (Table I).

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