



Various application methods on groundnuts using ComCat

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Motivation

- Agriculture is an important sector world wide because it eliminates poverty and sustain development.
- In order to get high production good management is required
- Use of a natural plant extract based product “ComCat” can be used to increase yield and growth of the plant and increase its resistance against various stress conditions.
- However various applications method is investigated to make the application as economic as possible.

Mesotrione application

- Mesotrione was applied at four concentrations;
 - 0 $\mu\text{l}/\text{kg}$ soil (0 DAA),
 - 1.6 $\mu\text{l}/\text{kg}$ soil (45 DAA),
 - 0.05 $\mu\text{l}/\text{kg}$ soil (90 DAA) and
 - 0.0016 $\mu\text{l}/\text{kg}$ soil (135 DAA).
- The rates simulates the concentration of mesotrione in the soil in the soil at 0, 45, 90 and 135 days after application (DAA) applying 124.8 g ai ha⁻¹ of mesotrione.

ComCat Application

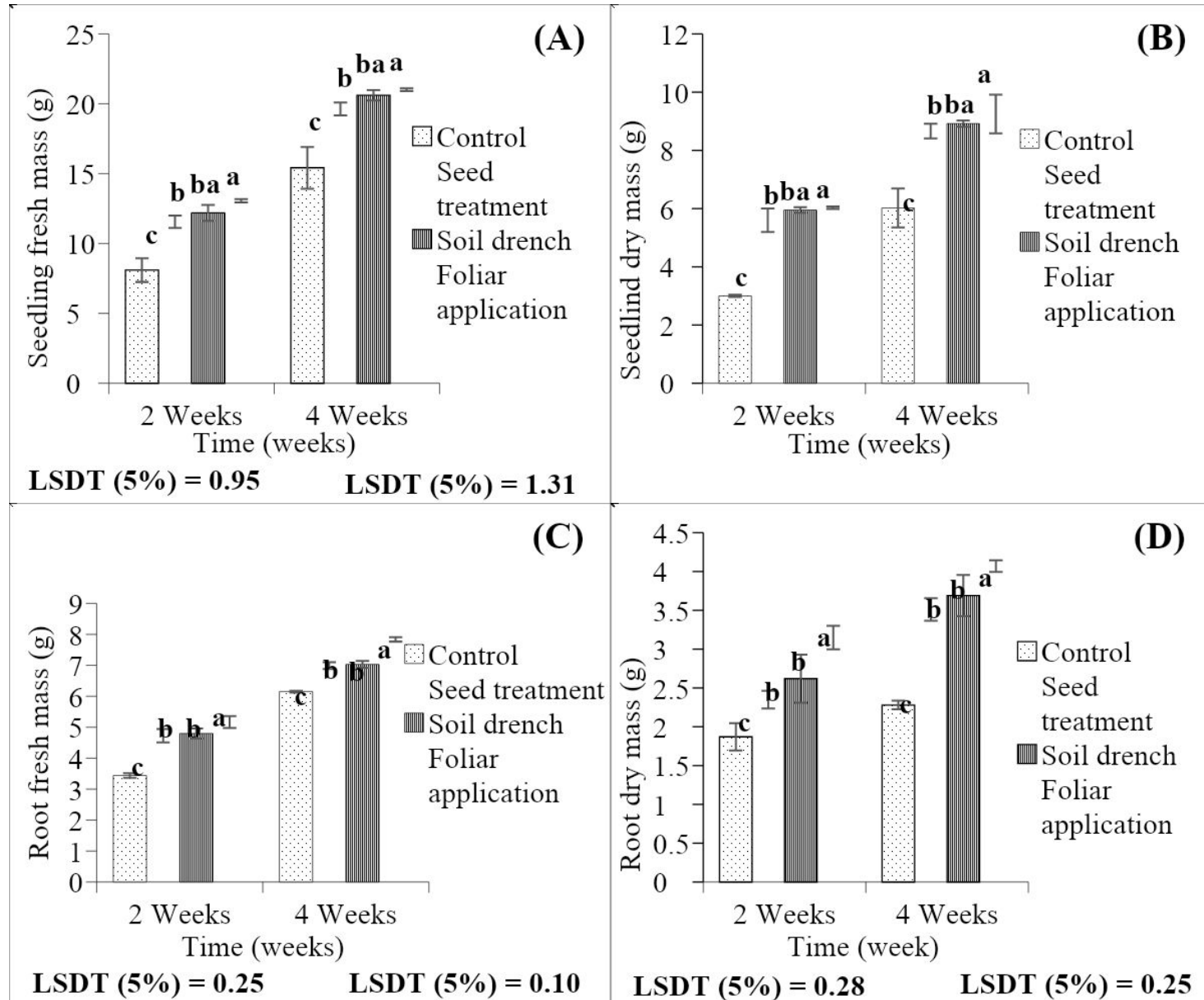
- ComCat is applied at:
- As a **seed treatment (ST)** where seeds of three legume seeds were treated with 100 g ComCat/ ton of seeds (Preventative treatment),
- Secondly as a **foliar application (FA)** where 100g ComCat/ 300L/ha water sprayed on the leaves one week after emergence (Corrective treatment)
- And thirdly using it as a **soil drench(SD)** where ComCat at 400g /40 000L/ha water was applied at plant (Preventative treatment).



Morphological parameters



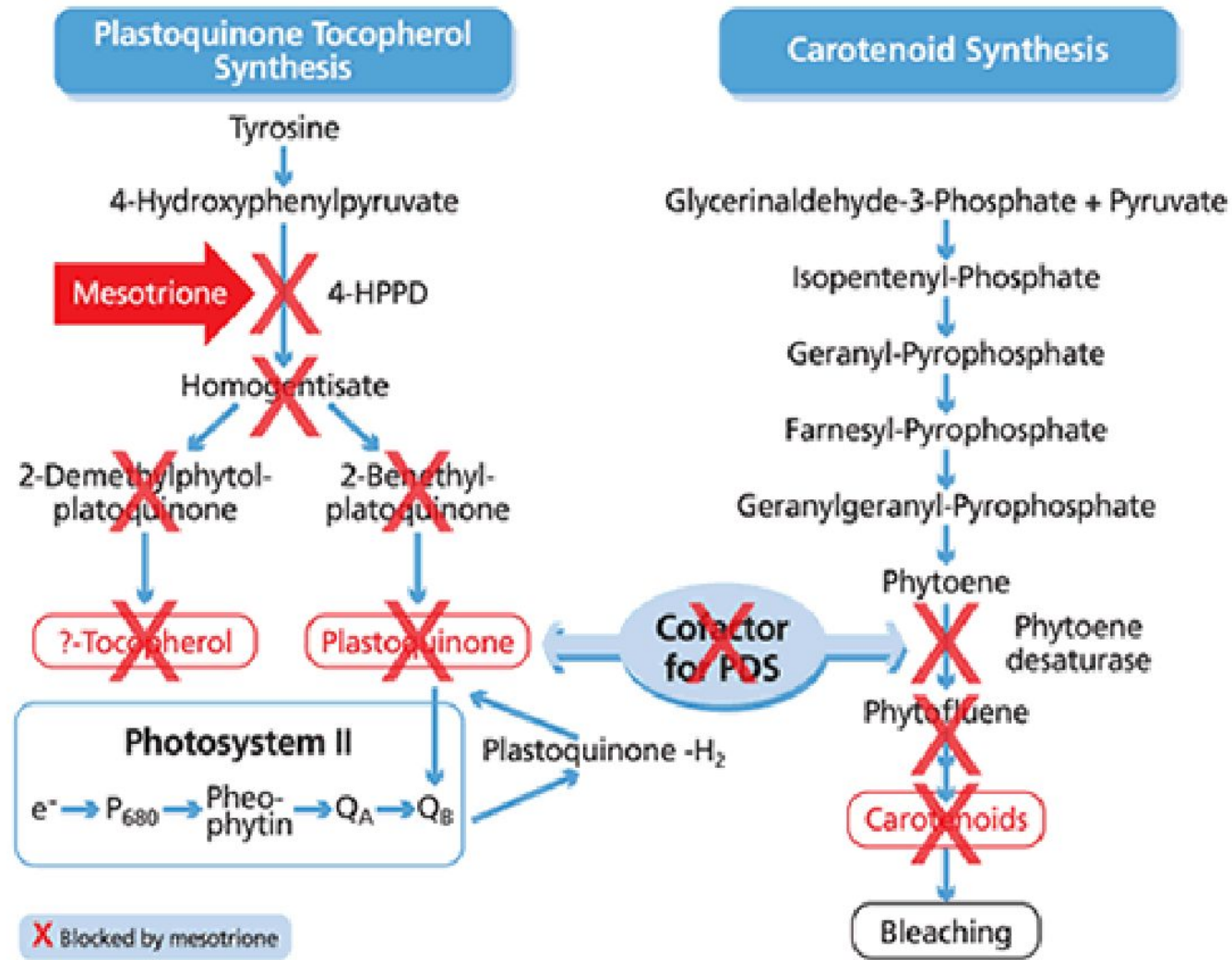
The morphological response of groundnut to ComCat application methods, seed treatment, soil drench, foliar application and control on destructive seedling growth parameters including seedling fresh mass (A), seedling dry mass (B), root fresh mass (C) and root dry mass (D) measured every two weeks



The effect of ComCat application methods, seed treatment, soil drench, foliar application and control on morphological parameter over a period of 12 weeks. Measured parameters being natural plant height, extended plant height and stem diameter.

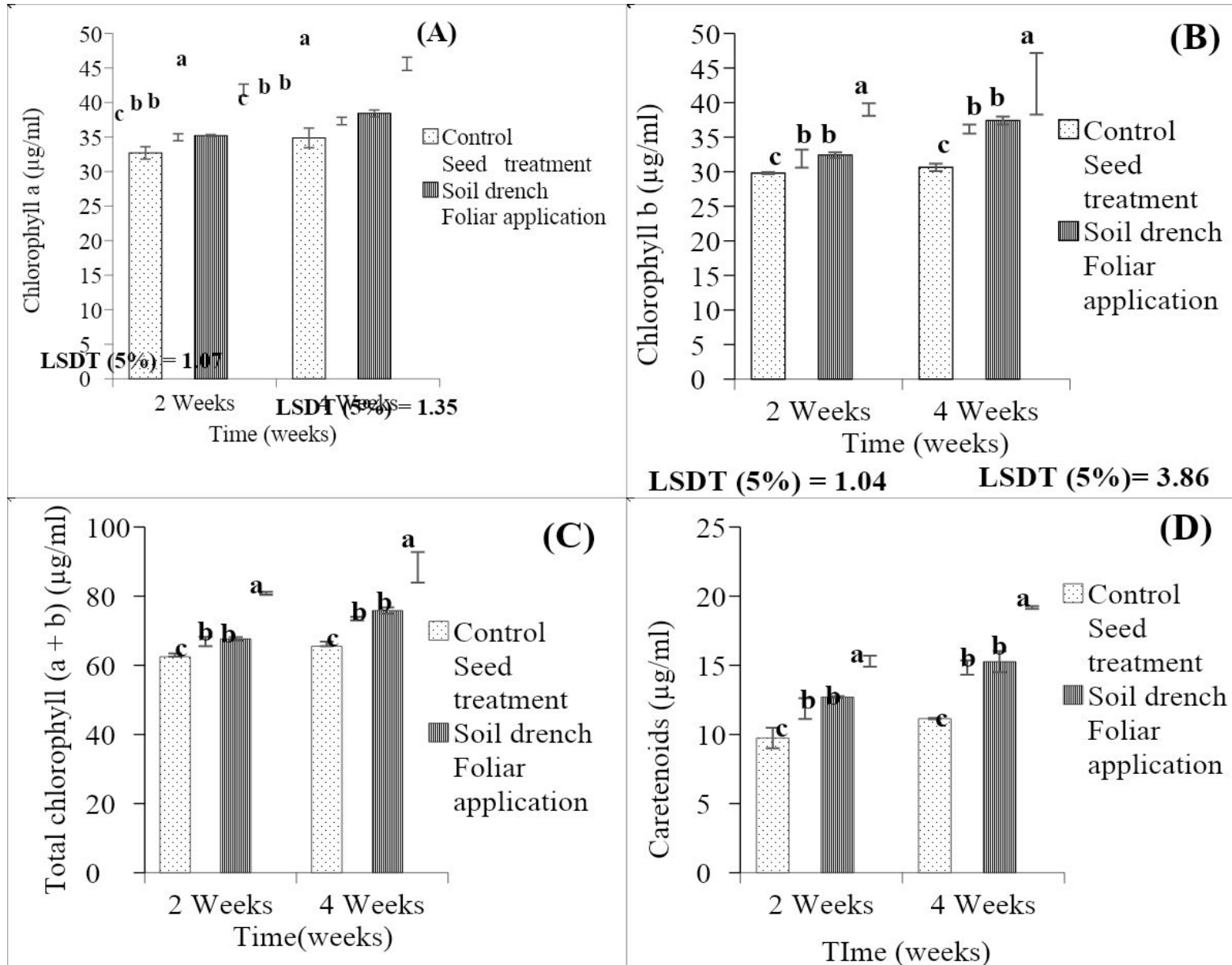
	Treatment	2 Weeks	4 Weeks	6 Weeks	8 Weeks	10 Weeks	12 Weeks
Natural plant height (cm)	Control	8.88 d	14.93 c	20.80 c	26.95 c	32.75 c	37.53 c
	Seed treatment	9.50 c	16.85 b	23.40 b	28.90 b	35.75 b	39.50 b
	Soil drench	10.00 b	17.10 b	24.60 b	30.68 b	36.30 b	40.55 b
	Foliar application	11.00 a	18.75 a	27.18 a	34.20 a	38.98 a	45.58 a
	LSD_T (5%)	0.44	1.39	1.32	1.85	1.87	1.30
Extended plant height (cm)	Control	12.18 d	19.05 c	25.78 c	32.10 c	37.13 c	41.00 c
	Seed treatment	13.90 c	21.40 b	27.98 b	33.80 b	38.95 b	42.98 b
	Soil drench	16.28 b	22.33 b	28.18 b	34.10 b	39.25 b	44.13 b
	Foliar application	18.80 a	24.70 a	31.95 a	37.95 a	42.53 a	47.43 a
	LSD_T (5%)	1.18	1.23	0.68	0.77	0.77	1.38
Stem diameter (mm)	Control	3.36 c	3.70 c	3.91 c	4.41 c	4.70 c	4.82 c
	Seed treatment	3.45 b	3.78 b	4.23 b	4.64 b	4.87 b	5.01 b
	Soil drench	3.48 b	3.80 b	4.27 b	4.68 b	4.92 b	5.06 b
	Foliar application	3.80 a	3.93 a	4.39 a	4.79 a	5.11 a	5.23 a
	LSD_T (5%)	0.08	0.08	0.11	0.04	0.12	0.15

Physiological parameters

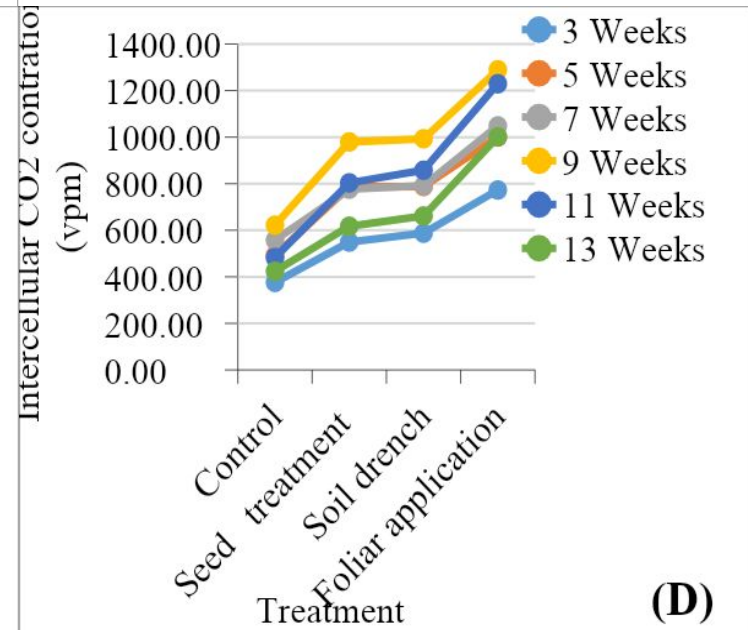
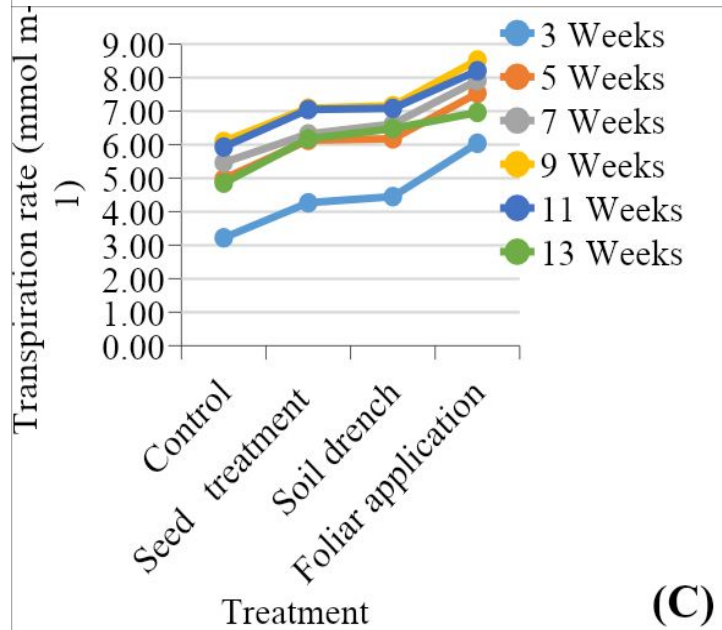
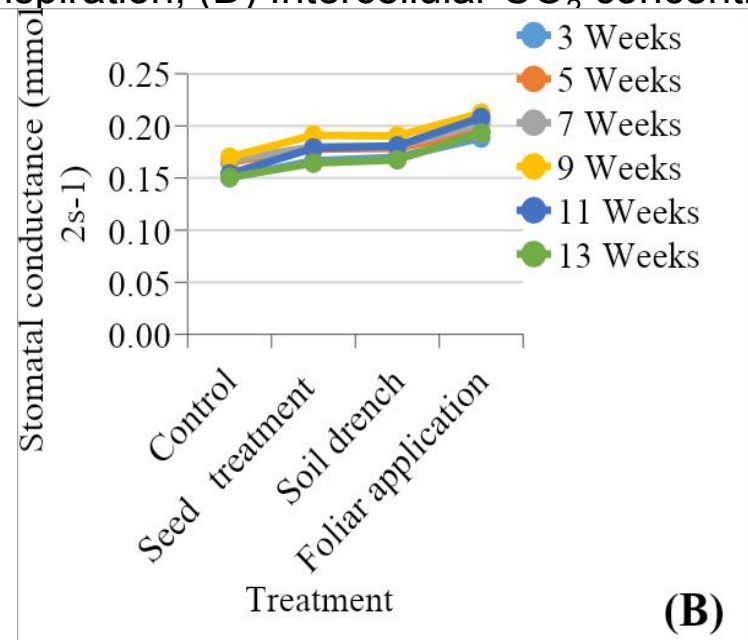
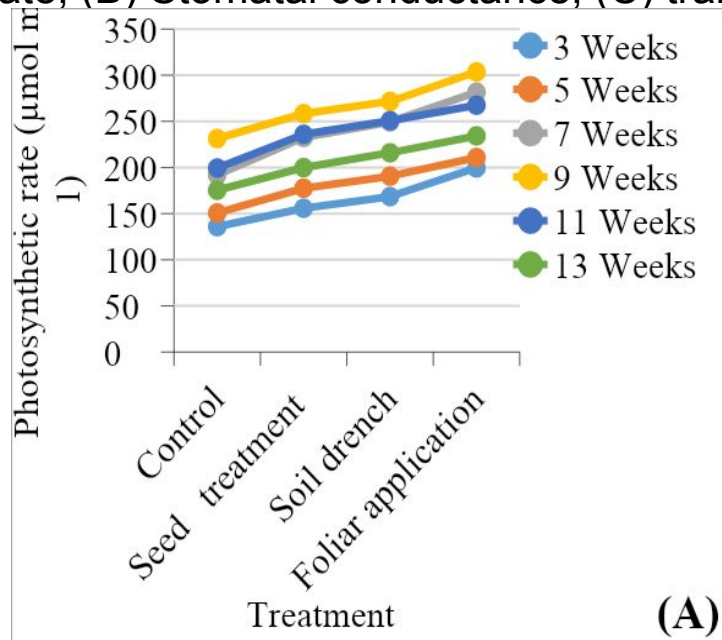


Mesotrione inhibition of the enzyme HPPD and carotenoid biosynthesis (Adapted from Syngenta, 2008).

The effect of three application methods of ComCat seed treatment, soil drench foliar application and control on chlorophyll content (chlorophyll a (A), chlorophyll b (B), total chlorophyll (C) and carotenoids content (D)) measured after every two weeks over a period of four weeks on groundnut.



The physiological response of groundnut to three application methods of ComCat seed treatment, soil drench, foliar application and control measured over a period of 12 weeks. Measured parameters include (A) photosynthetic rate, (B) Stomatal conductance, (C) transpiration, (D) Intercellular CO₂ concentration



Yield data



The effect of three methods applications of ComCat seed treatment, soil drench, foliar application and control on groundnut yield components (number of pods per pot, mass of pods per pot, number of seeds per pot and mass of seeds per pot (final yield per pot)).

Treatment	Number of pods per pot	Mass of pods per pot (g)	Number of seeds per pot	Mass of seeds per pot (g) (yield per pot)
Control	47.50 c	22.62 c	72.75 c	18.35 c
Seed treatment	55.75 b	27.84 b	115.75 b	24.53 b
Soil drench	56.75 b	28.21 b	119.00 b	24.76 b
Folia application	65.25 a	31.32 a	128.00 a	27.38 a
LSD_T (5%)	8.09	2.21	7.25	2.11

Conclusion

- All the different application methods of ComCat had a significant positive effect on both the morphological and physiological parameters measured.
- Foliar application (corrective method) showed the best results after application on all the physiological and morphological parameters.
- However all the other application methods also significantly increase yield and yield components.