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MORPHACTIN-INDUCED DEVELOPMENT OF ROOTS IN THE SEEDLINGS OF CASTOR (*RICINUS COMMUNIS* L.)

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MORPHACTINS, the derivatives of fluorene-9-carboxylic acid have inhibitory effect in root initiation[1–11]. There are some other instances where they promote rooting[12–15]. However, their activity changes with season as well[7]. This paper gives an account of the findings on rooting of castor seedlings as induced by a morphactin.

Mature and healthy seeds of castor (*Ricinus communis* L.) were soaked in 500, 300, 250, 150, 125, 100, 75, 50, 10, 0.1 ppm solutions of morphactin EMD-7311, and water (control). After 24 hr, they were washed with distilled water and then planted in earthenware pots. Each pot contained 10 seeds. They were exposed to diffused sunlight and watered at regular intervals of time. After 10 days of growth, the seedlings were carefully removed from the pots. The length of the radicle, the number and the length of lateral roots, and the percentage of seedlings with apogeotropic roots was determined. The average of 5 seedlings is given in table 1.

The experimental data clearly indicate that higher concentrations (500–50 ppm) of morphactin proved to be extremely ineffective in promoting growth of the radicle. Elongation of the radicle in comparison to control was increased only at fairly low concentrations of 10 and 0.1 ppm. But this increase too, did not seem to be greatly significant. At 300, 250, and 125 ppm, radicle tips of all the seedlings were considerably swollen and became almost spherical in shape. From these swollen tips, lateral roots developed in clusters. The root formation was however, completely inhibited at 500–250 ppm. There was a progressive increase in the length from the higher to lower concentrations. Hence, the shortest radicle length was found at 500, and the longest at 0.1 ppm.

Thickening of the roots of caster seedlings by a morphactin (EMD-7301 W) has also been reported by

Table 1 *Effect of morphactin on seedling of castor*

Concentration (ppm)	Length of Radicle (cm)	No. of Lateral Roots	Length of Lateral Roots (cm)	% of Seedlings showing (–)geotropism
EMD. 500	3.00 ±2.04	0	0	0
300	3.20 ±2.46	0	0	0
250	4.70 ±2.24	0	0	0
150	5.02 ±2.34	7.0 ±1.00	1.12 ±0.54	40
125	5.25 ±1.82	8,0 ±3.55	1.25 ±0.21	10
100	6.10 ±4.12	9.0 ±4.55	1.66 ±0.24	10
75	6.50 ±1.96	11.0 ±3.00	3.40 ±0.48	20
50	10.20 ±2.56	19.4 ±8.55	3.43 ±0.41	60
10	12.75 ±4.32	19.7 ±4.81	5.80 ±1.16	40
0.1	12.75 ±5.66	32.6 ±8.73	6.70 ±0.24	20
0	12.00 ±1.04	19.0 ±6.89	5.80 ±0.50	0

Reuben *et al*[9]. According to them, reduced rate of mitosis and non-polar cell division in the cortical cells of roots, as suggested in *Pisum sativum*[16] may be responsible for these 'tumour-like thickenings'.

Decrease in length of radicle by morphactin is similar to the effect of GA_3 and coumarin in *Hibiscus esculentus*[17], where only the lower concentrations of phosphon and B-nine increased the radicle size. In *Cicer arietinum*[18] also, CFI at concentrations above 10^{-7} M decreased root length. The number of lateral roots arising singly was highly reduced. The same phenomenon has been observed in castor. While the number of lateral roots was increased over control at 50 ppm and beyond, it was considerably reduced at 150–75 ppm. In many other cases[19–23], morphactins have an inhibitory effect on the length of roots or the formation of lateral roots. In *Bryophyllum tubiflorum*[24], CFI is reported to increase the number of roots per epiphyllous bud. It even stimulated lateral root formation upto 20 ppm and reduced it at 40 ppm.

The inhibitory effect of morphactins on the formation of lateral roots, is not due to an inhibition of the initiating cell divisions in the pericycle, which are actually strongly stimulated[15]. It is mainly due to the effect on the emergence and elongation of the side root or the normal organization of their primordia.

The different concentrations of morphactin had a similar direct relation with the length of lateral roots-lower concentrations stimulating and higher ones retarding. Shortest length, therefore, was at 150 ppm.

The lateral roots were negatively geotropic to varying degrees at all concentrations. The highest percentage of seedlings with such roots was at 50 ppm, whereas control seedlings had none. It is suggested[25] that the lateral transport of IAA is suppressed by morphactins which ultimately results in an upward growth of the roots.

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OVARY WALL OBTURATOR IN *OTTELIA ALISMOIDES*

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OBTURATORS are specialised glandular structures involved in directing the pollen tube towards the mic-