J. India bot. Soc. **65** : 107—110, 1986

EFFECTS OF KINETIN ON SEEDLING GROWTH AND DEVELOPMENT ON ELEVEN CULTIVARS OF *LEUCAENA LEUCOCEPHALA* (LAMK.) DE WIT.[1]

MINU

Botany Department, Institute of Advanced Studies, Meerut University, Meerut

ABSTRACT

Effects of different concentrations of KN (10 to 100 ppm) on hypocotyl and radicle length, number of lateral roots, fresh and dry weight of entire seedling of eleven cultivars of *Leucaena leucocephala* (Lamk.) Wit (Viz. cv. Peru, Pirasicana, Campena grandi, Gum variety, K-28, MU, FG-3, FG-6, FG-9, K-8 and FG-13) have been studied. One or more length parameters were promoted by lower concentrations in cv. Peru, Pirasicana, Gum variety, MU, FG-3, FG-6 and FG-9, while cv. Campena grandi, K-28, K-8 and FG-13 exhibited inhibition in all the concentrations. Formation of lateral roots increased with 10 ppm treatment in Peru, FG-3, FG-9 and FG-13, but completely suppressed in cv. MU. Treatments of all the concentrations were found promotory for fresh weight in Pirasicana, FG-6 and FG-13 and for dry weight in Pirasicana, FG-3 and FG-13. In the other cultivars fresh and dry weights increased with treatments of lower concentration only.

INTRODUCTION

Leucaena leucocephala has attracted the attention of villagers and the scientists because of its multipurpose utility in various fields including social forestry, fuel, fodder and soil enrichment with Nitrogen and Potassium salts. However, inspite of fast growth of the plant, the seedling faces the problem of establishment due to comparatively slow grwoth. A review of literature revealed that no work has been done on this plant in this respect. Hence, to find out some suitable treatment, which may provide vigorous seedlings, effect of kinetin on seedling growth and development of eleven cultivars of *L. leucocephala* (Lamk.) de Wit was undertaken.

MATERIALS AND METHODS

Seeds of nine cultivars were obtained from Bhartiya Agro Industrial Foundation, Pune, those of K-28 from I. A. R. I., New Delhi, and of MU were collected from Meerut University Campus. Healthy seeds of each cultivar were scarified with sand paper, sterilized with 0.01% HgCl washed thrice with distilled water and were soaked for 24 hours in 10, 25, 50 and 100 ppm of KN. For this purpose 100 ppm solution of KN was prepared by dissolving the growth regulator in KOH and then making the final volume with distilled water and this solution was further diluted according to requirement. After thorough wash with distilled water 20 seeds of each treatment were allowed to

---

1. The paper was awarded a merit certificate and Cash Prize in VIII All India Botanical Conference held at Hyderabad in 1985.

Guidance and encouragement by Prof. Y. S. Murty and award of fellowship by C. S. I. R. are gratefully acknowledged.

germinate on three layers of moist sterilised filter papers in 15 cm diameter Petridishes at room temperature in diffused light and were watered equally and regularly throughout the experiment. Three replicates for each treatment were maintained. Seeds soaked in distilled water for 24 hours were treated as control. To determine the growth and development, length of radicle and hypocotyl, number of lateral roots, fresh weight and dry weight were taken as parameters. Fifteen seedlings per replicate for length parameters and lateral root and five seedlings per replicate for weight were considered. The length parameters were measured on 4th, 5th, 6th and 7th day after soaking, while the other parameters on the 7th day after soaking. Mean values were calculated and the data have been analysed, where ever necessary.

RESULTS

(a) *Length of radicle :* In Peru type all the concentrations of KN were found inhibitory and the inhibition increased with increasing concentrations. On 7th day after soaking the values in 10, 25, 50 and 100 ppm were 6.34, 6.32, 5.87 and 4.86 cm respectively and 7.72 cm in control. Similar reduction was observed in comparison to control in Pirasicana, Campena grandi, K-28, MU, FG-3, K-8 and FG-13. However, promotion in radicle length over control with treatment of 10 ppm was observed in varieties Gum, FG-6, and FG-9.

(b) *Length of Hypocotyl :* Increase in hypocotyl length over control was observed in treatments of lower concentrations of KN in Peru, Pirasicana, Gum variety, MU and FG-3, but higher concentrations caused reduction. In the remaining cultivars all the treatments were found inhibitory and the inhibition increased with the increasing concentrations.

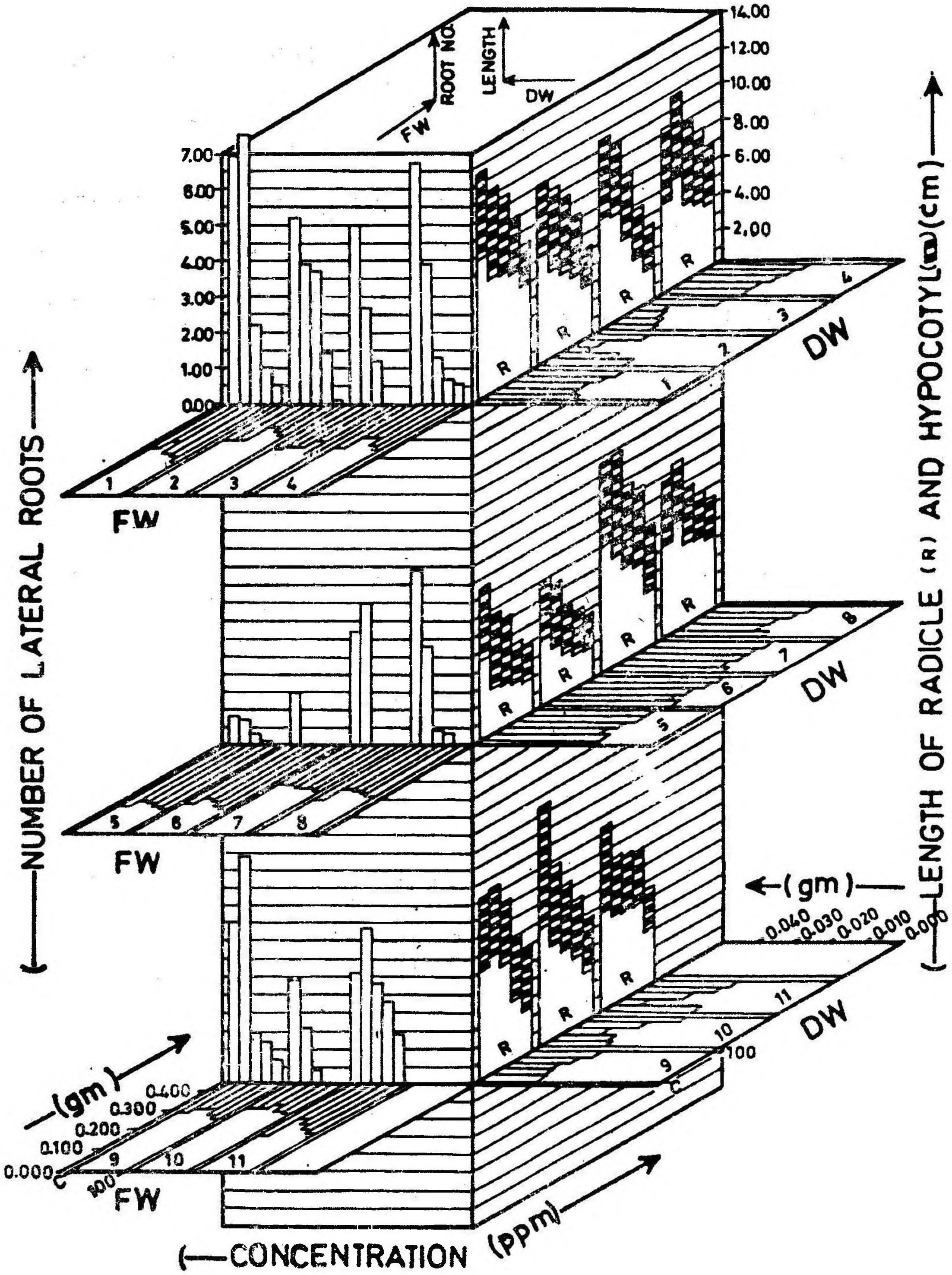
(c) *Number of lateral roots:* In Peru type the number of lateral roots increased from 6.90 in control to 7.50 in 10 ppm treatment, but in all other concentrations the number of lateral roots showed gradual decrease with increasing concentrations and was only 0.50 in treatment of 100 ppm. Similar results were observed in Cv. FG-3,FG-9 and FG-13. For the remaining cultivars all the concentrations were found inhibitory In case of cv. MU the lateral roots were completely suppressed even with the lower concentration, while in FG-3 with 25, 50 and 100 ppm in Campena grandi and K-8 with 50 and 100 ppm respectively.

(d) *Fresh weight :* All the concentrations were found promotory in Pirasicana, FG-6 and FG-13 and the higher values in comparison to control were obtained in either 25 ppm as in Pirasicana (0.327/ 0 266 gm) or in 10 ppm as in FG-6 (0.251/ 0.195 gm) and FG-13 (0.265/0.184 gm). Even in the other cultivars the highest values were obtained in 10 ppm in Peru, Gum variety, K-28, MU and FG-3 except in FG-9, K-8 and Campena grandi, where treatments of 25 and 50 ppm caused the maximum increase.

(e) *Dry weight :* Dry weight values were promoted in all the concentrations in Pirasicana, FG-3 and FG-13. Gum variety showed no promotion in any concentration. The highest values in different cultivars were in 10, 25 and 50 ppm.

DISCUSSION

Promotion as well as inhibition in length parameters through KN treatments, as observed in the present study, has also been reported in several members of Leguminosae by earlier workers including Toky and Nanda (1970), Choe (1972), Abotabeekh (1974), Dubuco(1976), Abbas and Abotabikh (1976), Saxena and Maheshwari (1979) and Babu and Kumar



Figure—1. Effects of different concentration of kinetin (10, 25, 50 and 100 ppm) on different parameters in cultivars of *Leucaena leucocephala*-

(1) Peru (2) Pirasicana (3) Campena grandi (4) Gum variety (5) K-28 (6) MU (7) FG-3 (8) FG-6 (9) FG-9 (10) K-8 (11) FG-13.

(1979). Mehta *et al.* (1974) considered that KN induced promotion in the growth rate at early seedling stage is the result of increased cell division rate. That the effect of KN on seedling growth depends upon the endogenous level of the growth regulator is confirmed by the present concentrations and inhibition in higher concentrations.

Inhibition of lateral roots has also been reported by Whightmann *et al.* (1980) in *Pisum sativum*. Significant increase in fresh weight and dry weight as compared to control as observed in the present treatments has also been reported by *Mehta et al.* (1974) in *Cajanus cajan* and Babu and Kumar (1979) in members of Fabaceae. They considered higher fresh weight in KN treated seedlings as the result of higher water uptake i.e. increased moisture content. Reduction in weight through KN treatment has also been reported by Saxena and Maheshwari (1979) in *Glycine max*.

It is concluded that the seeds of *Leucaena* cultivars speci lly of FG-3, FG-9, Peru, Gum variety and FG-6 may be soaked in KN solutions of lower concentrations before sowing in order to obtain vigorous seedlings which can establish well and show better growth in future.

Such studies with other growth regulators are in progress and it is expected that the results including that of the present study would provide some suitable guideline for the large scale propagation of *Leucaena*.

REFERENCES

Abbas, T. and A. Abtabeekh 1976. The effect of KN and GA on some morphological characteristics of *Vigna sinensis*. *Bull. Soc. Hist. Nat. Afr. Nord.* **66** : 123-149.

Abtabeekh, A. 1974. Effect of kinetin on growth and development of *Pisum sativum*. *Bull. Coll. Sci. Univ.*, Baghdad. **15** : 3-12.

Babu V. R. and S. Kumar 1979. Seed germination and early seedling growth of *Cicer arietinum* L. cv. C-235, *Cajanus cajan* Spreng. cv. Pusa Agati, *Phaseolus aureus* Ham. cv. S-8 and *Phaseolus mungo* L. cv. P-1 under growth regulator and salinity-stressed conditions. *J. Indian bot. Soc.* **58** : 140-148.

Choe, H. T. 1972. Effects of pre-soaking seeds of *Pisum sativum* in GA_3, IAA and Kinetin solution on seedling growth. *Hort Sci.* **7** : 476-478.

Dubuco, M. 1976. Compared action of IAA, Kinetin etheral on isoperoxidases and growth of *Lens culinaris*. *Med. Bull. Soc. R. Bot. Belg.* **109** : 93-108.

Mehta, P. M., M. T. Jacob and B. V. N. Rao 1974. The effect of ascorbic acid, kinetin, Coumarin and their combinations on the germination, growth and the enzyme catalase of *Cajanus cajan* var. Selection 4-2A, *Geobios* **1** : 53-58.

Saxena, O. P. and D. C. Maheshwari 1979. Influence of growth regulators on the seedling growth of ageing soyabean seeds. *Botan. Progr.* **2** : 80-83.

Toky, K. L. and K. K. Nanda 1970. Effects of morphactins, GA, Kinetin and IAA on elongation of hypocotyl and root of *Impatiens balasamia*. *Indian J. Pl. Physiol.* **13** : 49-56.