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IBA-K Induced Rooting in Perennials

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The effects of IBA-K treatment on the adventitious root rate and root number of cuttings of three herbaceous perennial species were determined. Cuttings were submerged in 500, 1000, or 2000 ppm IBA-K for 2 min or were quick-dipped in 1000, 3500, or 7000 ppm IBA-K for 20 sec. After 2 weeks rooting success was determined by root rate and root number. Root rate was evaluated by assigning cuttings numbers 0 to 3 (0-dead, 1-no callus, 2-callus, and 3-roots longer than 1 mm). Rooting success depended on season, method of IBA-K application, cutting technique, and concentration of IBA-K. However, response to these four factors was mostly inconsistent within and between species. Phytotoxicity was observed at high concentrations of IBA-K. Therefore, no recommendations for optimal treatment can be given without quantitatively measuring phytotoxicity as well as root rate and root number.

***Veronica* 'Noah Williams'.**

Root rate was not clearly affected by IBA-K. Cuttings that were submerged showed little difference among the control, 500 ppm, and 1000 ppm IBA-K treatments. At 2000 ppm, submerged cuttings showed a decrease in root rate. Cuttings that were basally dipped followed a similar pattern. The control, 1000 ppm, and 2000 ppm all rooted at the same rate. In addition, the control and 1000 ppm in the basal dip application had the same root rate as cuttings submerged at those treatments. At the highest basally dipped treatment (7000 ppm), root rate decreased and rooted at the same rate as the highest submerged treatment (3500 ppm) (Fig.1).

Results describing the effect of IBA-K on root number were unclear as well. In the submerged application, root number decreased at 500 ppm and then continued to increase at 1000 and 2000 ppm IBA-K. In the basal dip application, root number slightly increased as concentration of IBA-K increased up to 3500 ppm. At this point, there was a large increase from 3500 to 7000 ppm IBA-K. In both submerged and basal dip applications, the highest concentration of IBA-K had the smallest root rate but the largest number of roots (Fig.2).

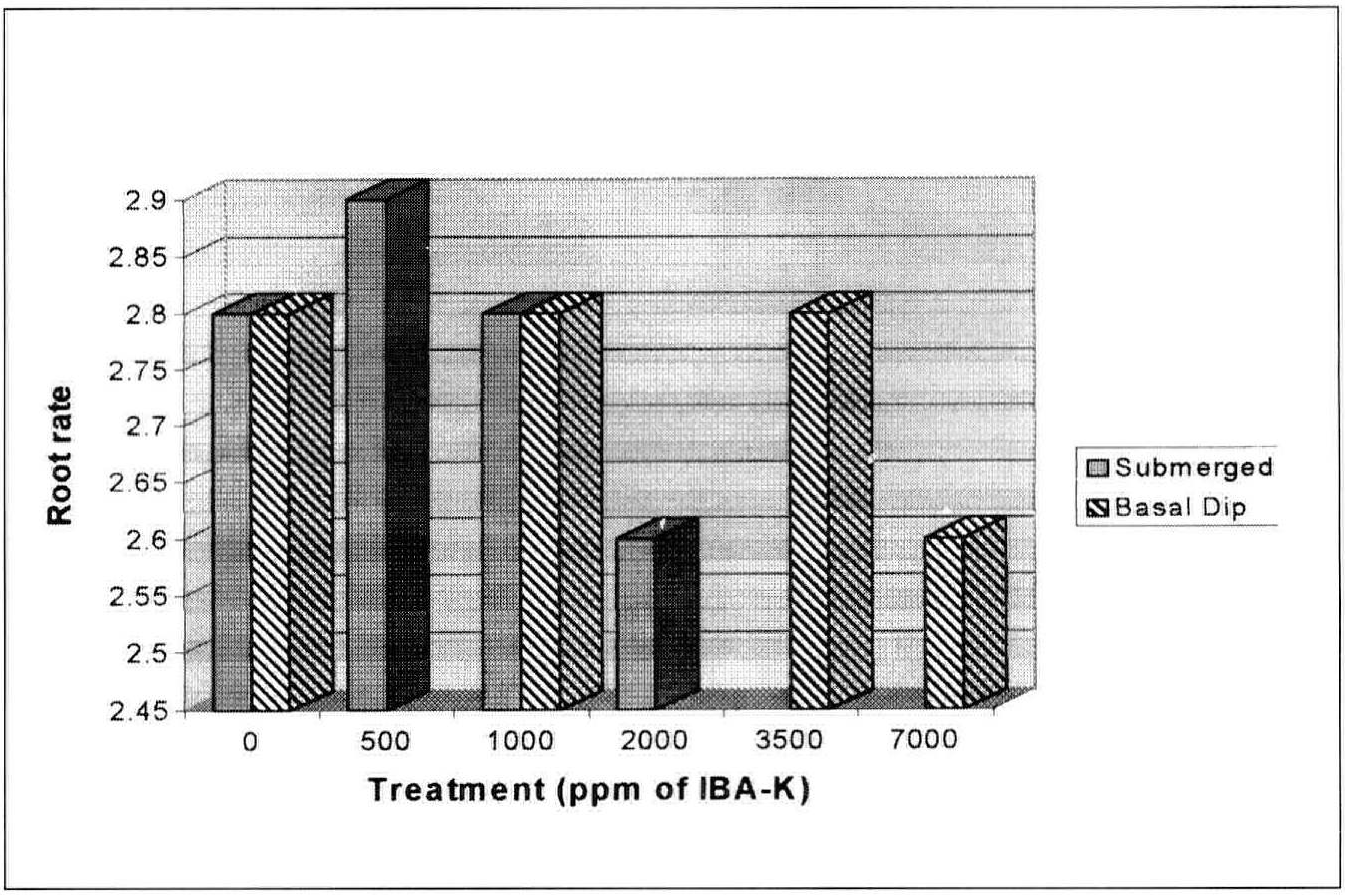

Figure 1. The effects of IBA-K on root rate in submerged and basally dipped cuttings of *Veronica* 'Noah Williams.'

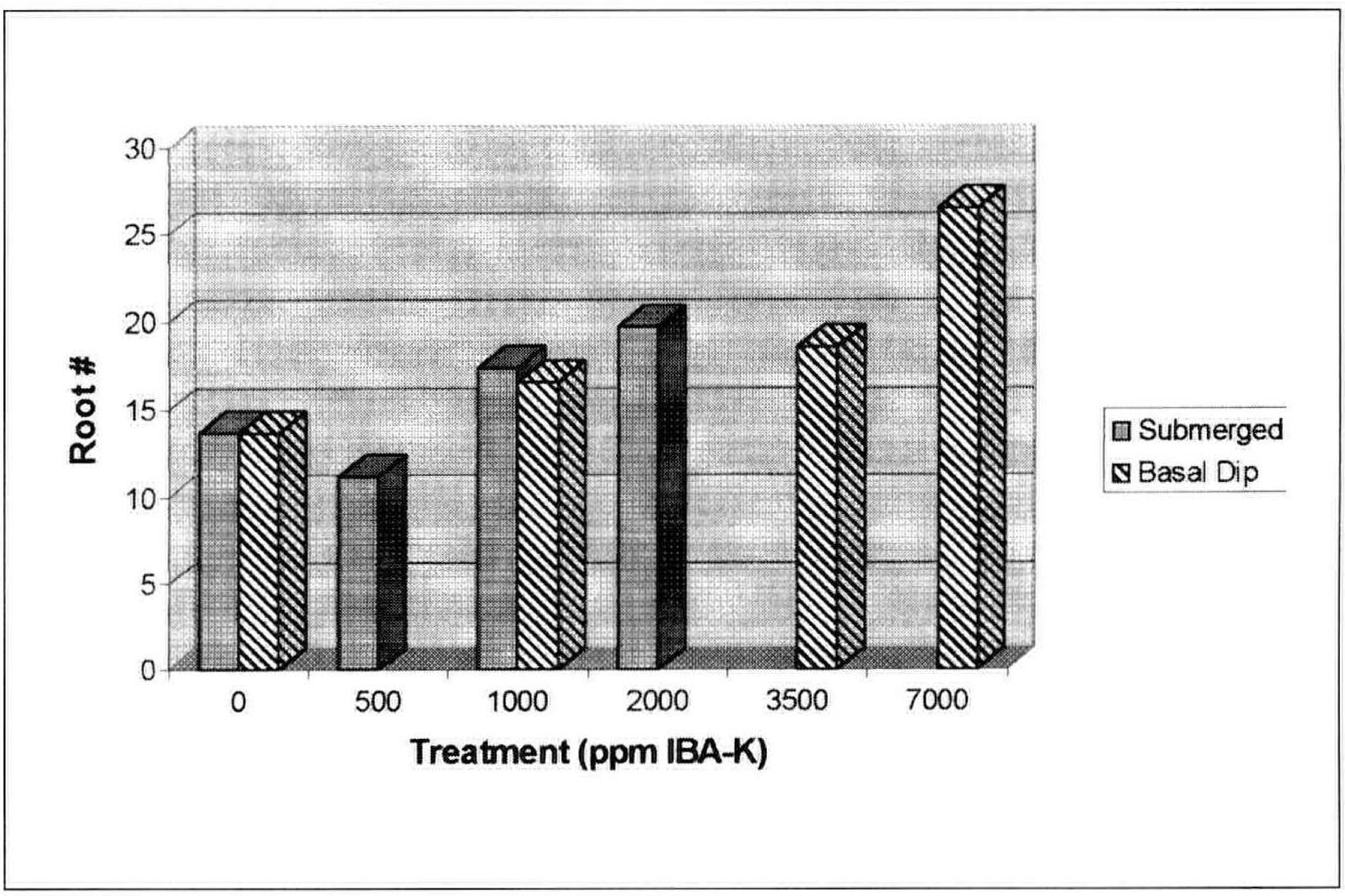

Figure 2. The effects of IBA-K on root number in submerged and basally dipped cuttings in *Veronica* 'Noah Williams.'

Severe phytotoxicity above the soil was observed. As IBA-K concentration increased, leaf burn increased, especially in cuttings submerged in rooting hormone. This may explain the lower root rate at high concentrations of IBA-K in submerged and basal dip applications. In addition, replication of this experiment during fall and spring did not affect the rooting success.

Achillea 'Moonshine'

Root rate was affected by IBA-K in both submerged and basal dip applications. Cuttings that were submurged with 500 ppm IBA-K had the same root rate as in the control. However, from 500 to 1000 ppm, there was a dramatic increase in root rate and then a leveling off at 2000 ppm. In the basal dip application, root rate increased as concentration of IBA-K increased up to 3500 ppm where root rate leveled off (Fig. 3).

As IBA-K concentration increased, root number increased in both submerged and basal dip applications. Cuttings that were submerged increased root number linearly up to 1000 ppm at which time, root number leveled off. However, cuttings that were basally dipped increased root number exponentially as concentration of IBA-K increased (Fig. 4).

At high concentrations of IBA-K, cuttings in both applications experienced phytotoxicity in the form of chlorosis. This could explain why root rate leveled off in both the basal dip and submerged applications. The leveling off at 1000 and 2000 ppm may have been a result of phytotoxicity in the submersion treatment. Phytotoxicity in the form of chlorosis did not affect root number in basally dipped cuttings as shown in Fig. 4.

Cuttings that were vegetative (no flower stalk) appeared to have better overall rooting success. Replication of this experiment showed that cuttings taken in the spring and fall did better than in the summer. This may be true because *A.* 'Moonshine' is a long-day obligate plant and cuttings taken during the summer were likely to contain flower stalks.

Baptisia pendula

Indole-3-butyric acid-potassium salt affected root rate in both submerged and basal dip applications. As IBA-K concentration increased, root rate in submerged cuttings increased up to 1000 ppm. From 1000 to 2000 ppm IBA-K root rate dramatically decreased. A similar trend occurred in the basal dip application. Root rate increased from the control to 1000 ppm, leveled off at 3500 ppm, and then a decreased from 3500 ppm to 7000 ppm (Fig. 5).

Increased IBA-K concentration did not clearly show an effect on root number in cuttings that were submerged. Root number went from approximately 4.5 in the control, to 7 at 500 ppm, back down to approximately 5 at 1000 ppm, and then finally back up at 2000 ppm. The basal dip cuttings followed a more consistent pattern. Root number increased with concentration up to 3500 ppm and then decreased (Fig. 6).

In the submerged application, root rate of treated cuttings was the smallest at the highest concentration (2000 ppm IBA-K) but had the largest root number. As expected, cuttings basally treated had the smallest root rate and root number at the highest concentration (7000 ppm IBA-K).

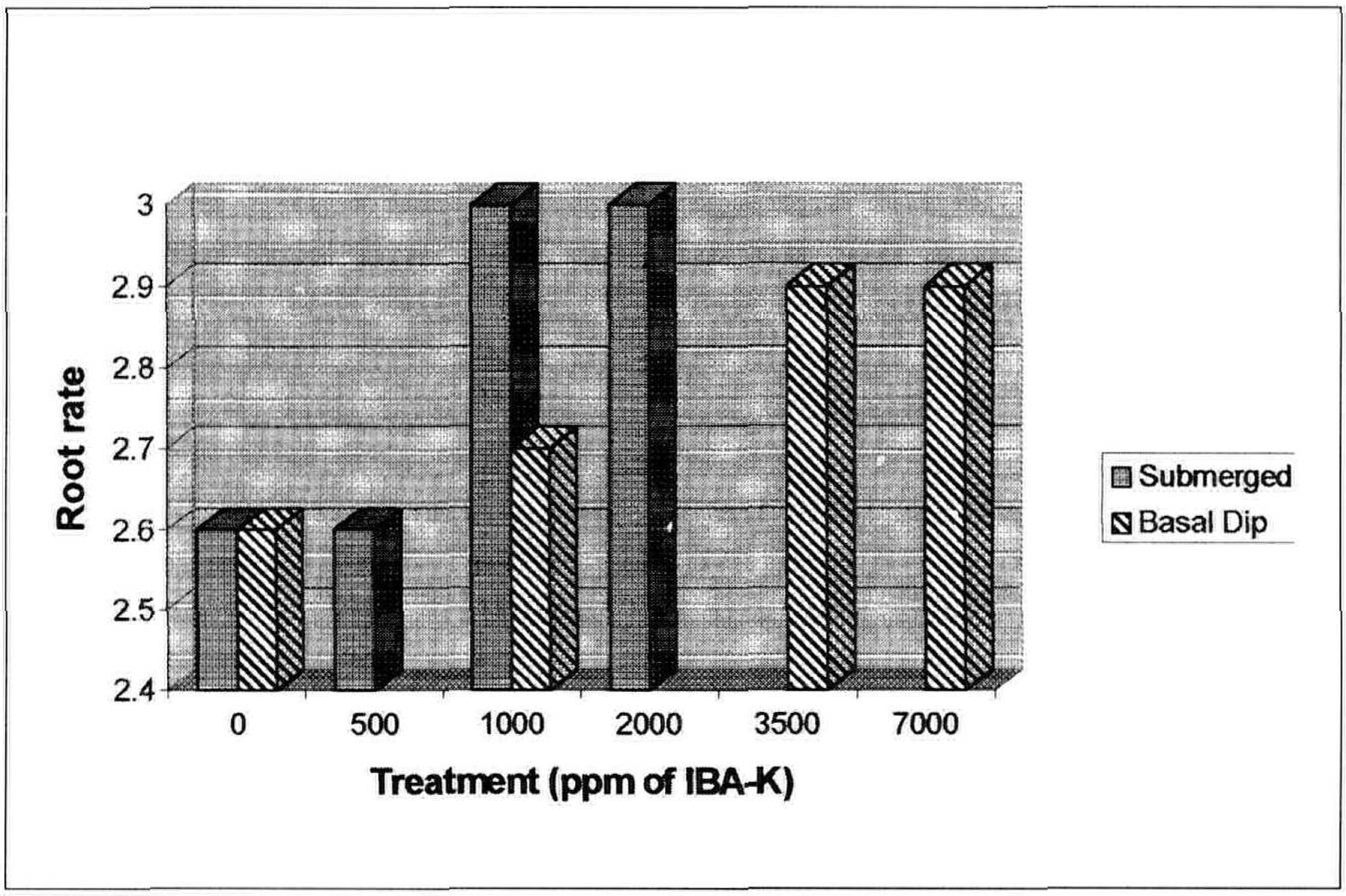

Figure 3. The effects of IBA-K on root rate in submerged and basally dipped cuttings of *Achillea* 'Moonshine.'

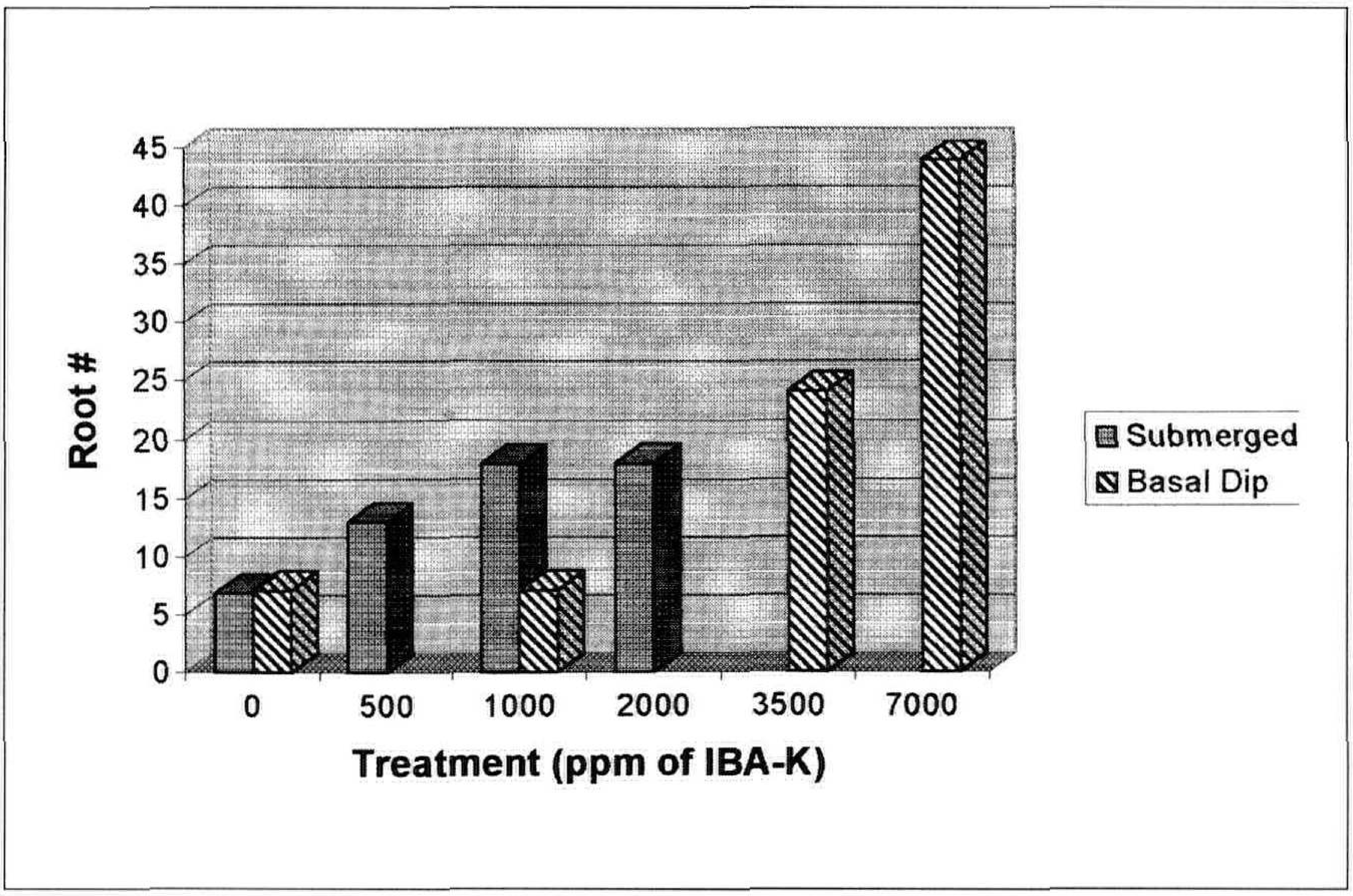

Figure 4. The effects of IBA-K on root number on submerged and basally dipped cuttings in *Achillea* 'Moonshine.'

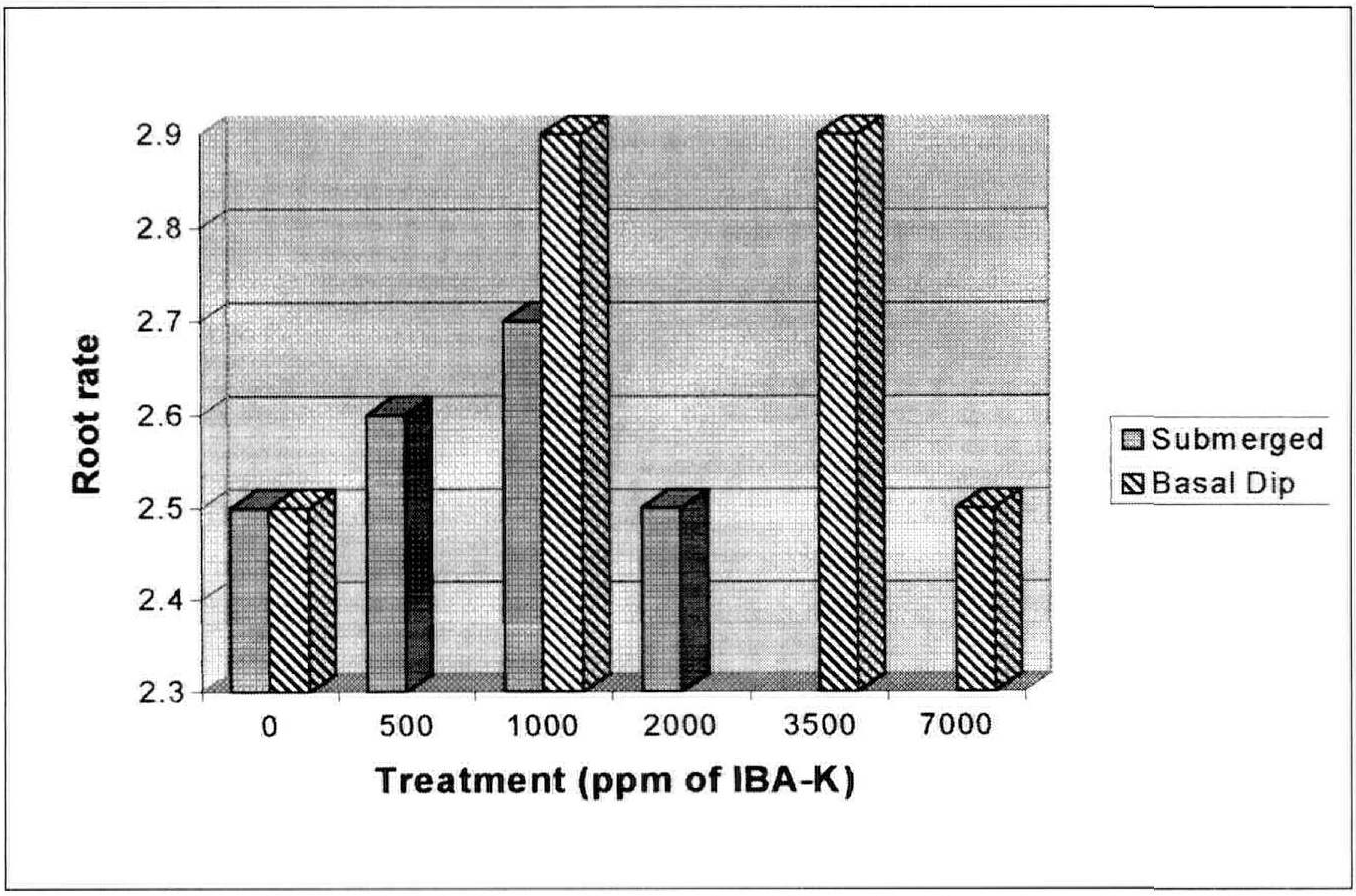

Figure 5. The effects of IBA-K on submerged and basally dipped cuttings of *Baptisia pendula*.

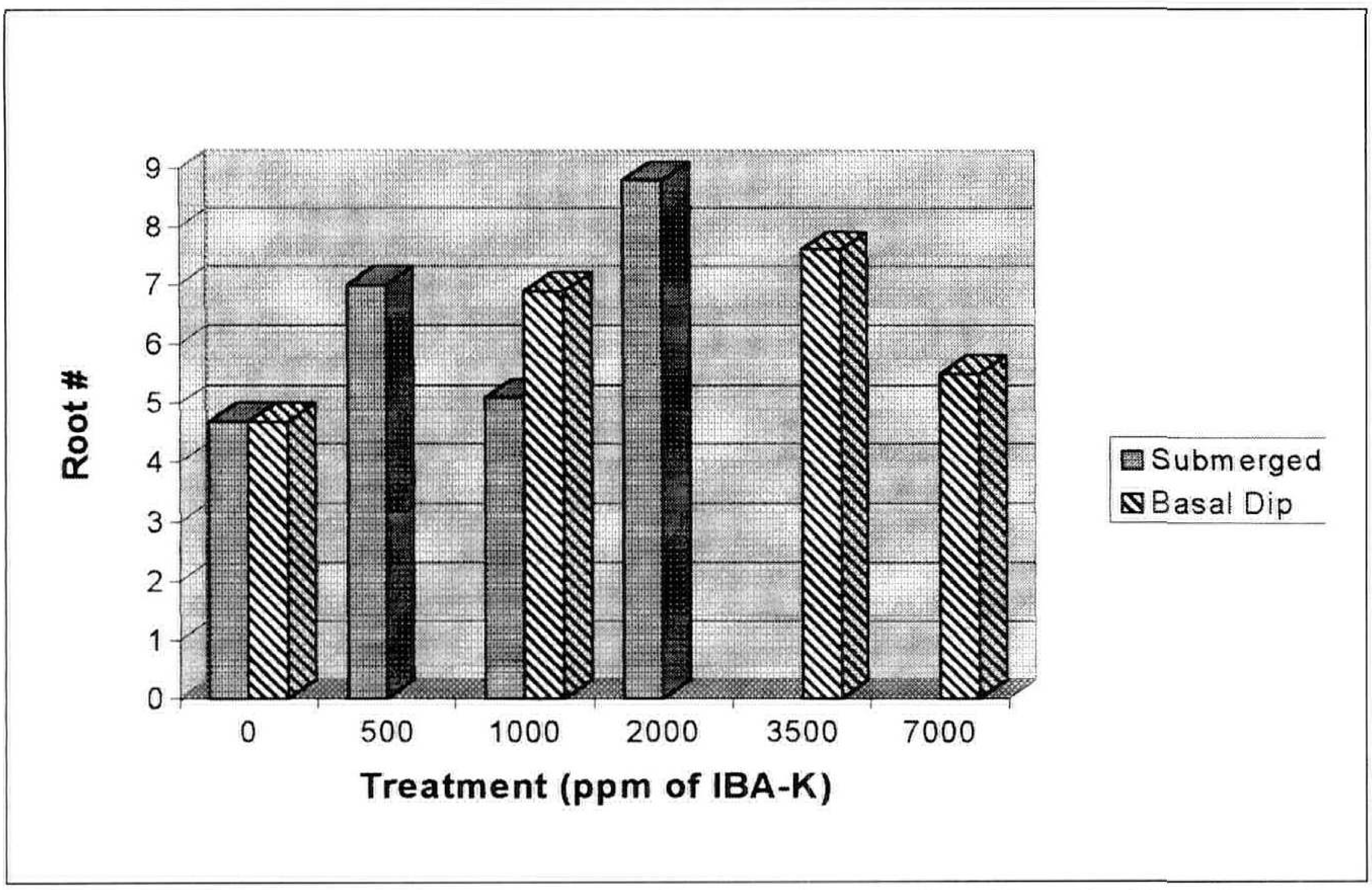

Figure 6. The effects of IBA-K on root number in submerged and basally dipped cuttings of *Baptisia pendula*.

Several factors may explain the inconsistencies in these results. Firstly, two different types of cuttings were taken for the experiment, tip and butt cuttings. Because tip cuttings contain younger, more tender tissue, these plants could have been more vulnerable at high concentrations of IBA-K, especially when applied by submersion. Phytotoxicity was observed above the soil at higher concentrations of IBA-K (leaf curl), almost exclusively with tip and submerged cuttings. Very little phytotoxicity above the soil was observed in cuttings that were basally dipped. Also, some cuttings contained one node and others contained two (one above and one below the soil). Two-noded cuttings had overall better rooting success.

Lastly, after replication of this experiment, time of season presented a noticeable difference in rooting success. Cuttings done in early spring performed much better than those taken during other seasons.