

# THE INDUCTION OF DORMANCY IN GRASS SEED BY PACLOBUTRAZOL: A METHOD TO IMPROVE FALL SEEDINGS

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## ABSTRACT

Dormancy can be induced in grass seeds by soaking in aqueous solution of gibberellin synthesis inhibitors, such as paclobutrazol and tetacyclacis. In a study conducted with perennial ryegrass (*Lolium perenne* L.) and tall fescue (*Festuca arundinaceae* Schreb.), dormancy was induced by a 48 hour soak at 35° C in 100 micromolar tetacyclacis (TCY) and 100 micromolar paclobutrazol (PB) as determined by failure to emerge at 20° C. Emergence in the untreated, water soaked, TCY soaked and PB soaked seeds were 92, 92, 10 and 18 % respectively. The containers containing seed and seedlings were then held at 5° C for 3 months and then transferred to 25° C for determining further emergence. Dormancy was released in tall fescue but not in perennial ryegrass. Emergence was 0, 2, 50 and 53% of the remaining untreated, water soaked, TCY and PB soaked tall fescue seeds, respectively. A field study using 120 micromolar PB soaked seeds at 15° C was planted in Corning, NY on 10/6/94. Percent cover measured on 7/25/95 was increased due to PB treatment from 33 to 75% for the tall fescue and from 22 to 43% for the perennial ryegrass.

## KEYWORDS

Dormancy, seed, paclobutrazol, tetacyclacis, tall fescue, ryegrass

## INTRODUCTION

In the Northeastern United States, the early fall has soil moisture conditions suitable for fall planting grass seed but due to the cold winter and frost heaving conditions, late planted grasses have poor survival. Many construction projects are finished past the last recommended seeding date. In many cases, the seedlings are made with less than optimum results. It would be useful to be able to plant dormant seed which would overwinter and be ready for early germination, emergence and growth in the early spring when soil moisture conditions and temperatures would be optimum.

Dormancy has been induced in lettuce by GA biosynthesis inhibitors, tetacyclacis and paclobutrazol. Dormancy induced by tetacyclacis was released by moist chilling treatments (Khan, 1994). This study reports preliminary work done using these GA biosynthesis inhibitors to manipulate dormancy in grass seed.

## MATERIALS AND METHODS

Seeds of tall fescue and perennial ryegrass were treated with 100 micromolar solutions of paclobutrazol and tetacyclacis for 48 hours at 35° C. After soaking, the seeds were air dried at 25° C for 32 hours before planting. Seeds were planted in a peat-lite mix in plastic boxes and grown for 22 days at 20° C in a growth chamber, set at a 12 hour light/dark regime. Untreated and water soaked seed were also planted. The percent emergence after planting was recorded. After 22 days the boxes

containing the seeds/seedlings were held at 5° C for 3 months and then transferred to 25° C. Percent emergence after 50 days was recorded.

A field planting was conducted in 1994, at the USDA, NRCS, Big Flats Plant Materials Center in Corning, NY (42° N. lat., 77° W. long). The plots were established on a Unadilla silt loam soil. KY-31 tall fescue and common perennial ryegrass were treated with 120 microcolar solution of paclobutrazol for 22 hours (6 hours at 25° C, then 16 hours at 15° C). The seed was then dried with a fan at 25° C for 32 hours. The field was rototilled, hand raked and planted on 10/6/94. The seed was hand broadcast at 63 kg/ha, lightly fan raked, then hand tampered. The plot size was 1.5 X 1.5 meters with 3 replications per treatment in a completely randomized design.

The plots were evaluated for the number of seedlings per .09 M<sup>2</sup> and percent cover on 5/25/95 and 7/25/95 respectively. A paired t-test was conducted on percent cover.

## RESULTS AND DISCUSSION

Dormancy was induced in tall fescue and perennial ryegrass by both the PB and TCY treatment when soaked at 35° C. Emergence following planting at 20° C for the untreated, water soaked, TCY and PB treated tall fescue seed was 92, 92, 10 and 18% respectively, and 97, 83, 2 and 22% for the perennial ryegrass, respectively. After 3 months at 5° C, the containers were transferred to 25° C. Emergence following the moist chilling treatment for the untreated, water soaked, TCY and PB treated tall fescue was 0, 2, 50 and 53% of the remaining seed, respectively. There was little additional emergence of the perennial ryegrass seed.

There was an increase in percent cover from both the PB treated tall fescue and perennial ryegrass plots on 7/25/95, compared to the untreated controls. The tall fescue PB treatment had 75% cover (P=.034) and 23 seedlings/.09 M<sup>2</sup> compared with 33% and 16 seedlings/.09 M<sup>2</sup> for the control. The perennial ryegrass PB treatment had 43% cover (P=.11) and 8 seedlings/.09 M<sup>2</sup> compared with 22% and 8 seedlings/.09 M<sup>2</sup> for the control. For the field study, the seed was treated at a lower temperature which does not induce the degree of dormancy found at higher temperature treatments. There was an abundance of seed which germinated in the fall which did not survive the winter. It is anticipated that improved percent cover will be observed with the use of the higher temperature PB treatment for fall planted tall fescue.

## REFERENCES

**Khan, A.A.** 1994. Induction of dormancy in non-dormant seeds. J. Amer. Soc. Hort. Sci. **119** (3): 408-413.

