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Fertilizer-Clover Seed Contact Time on Clover Emergence and Growth

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Summary

Mixing clover seed with fertilizer would be a low-cost planting method if there were no toxic fertilizer effects to the inoculated clover seed. Fertilizer effect on clover seed was examined using three clovers, three inoculation techniques and nitrogen, phosphorus, and potassium fertilizers. Mixing clover seed with fertilizer for longer than 6 hours reduced germination and seedling vigor. Clover growth was reduced most by potassium, than phosphorus and least by nitrogen. Pelinoc-Pelgel inoculation method was superior to regular peat inoculant. Clover seed can be mixed with fertilizer for up to 6 hours if Pelinoc is used without harmful effects to clover growth.

Introduction

The most successful clover stands are obtained when the seed is drilled in the soil. However, planters capable of handling small clover seed are expensive and are not usually economical for the smaller forage producer. As an alternative, many producers have the fertilizer dealer mix the clover seed with the fertilizer which is broadcast on the pasture and harrowed in. However, there is a common feeling among soil and forage scientists that the acidic nature of fertilizer is detrimental to the rhizobia bacteria

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and maybe the clover seed. This study was conducted to determine the influence of nitrogen, phosphorus, and potassium fertilizers on inoculated clover seed in terms of seed germination and seedling weight.

Procedure

Bigbee berseem, Mt. Barker subclover, and La. S-1 white clover seed were: (1) un-inoculated (2) inoculated with regular peat inoculant, or (3) inoculated with Pelinoc-Pelgel inoculant. Each of the clover-inoculant treatments was mixed with ammonium sulfate (21-0-0), triple superphosphate (0-46-0) or murate of potash (0-0-60) which resulted in 27 different clover-inoculant-fertilizer combinations. Ten seed from each treatment were planted in pots after being in contact with the fertilizer for 0, 6, 12, 24, and 48 hours. Potting material was an equal mixture of sand, peat moss, and perlite. After 8 weeks the clover plants were dried and weighed.

Results and Discussion

Germination of the clover seed decreased slowly as the time the seed was mixed with fertilizer increased. Germination values shown in Figure 1 are averages across fertilizer and inoculation treatments for each clover. Under normal conditions the seed and fertilizer are mixed and put out within 6 hours. However there are times when spreading the seed-fertilizer mixture is delayed because of rainfall, mechanical breakdowns, or other problems. Because there was little difference between clover species in their response to inoculation and length of time in contact with fertilizer, data will only be shown for one of the clovers.

The effect of mixing berseem clover seed with nitrogen, phosphorus, or potassium fertilizer for 6, 12, 24, and 48 hours on seedling weight is shown in Figure 2. Leaving the clover seed mixed with the fertilizer from 6 to 24 hours reduced the berseem clover seedling weight 50 percent. Nitrogen fertilizer was least detrimental to clover growth followed by phosphorus and then potassium.

Clover seedlings must be infected by a specific rhizobia bacteria to obtain its nitrogen from the air and grow well. The rhizobia bacteria is contained in the inoculant which is applied to the clover seed before planting. The acidic nature of the fertilizer is toxic to the rhizobia bacteria. The decrease in clover growth as the time the inoculated clover seed and fertilizer are mixed together increases, is primarily due to the dying off of the rhizobia bacteria.

This is demonstrated in Figure 3 which shows the effect of inoculation treatment on subclover seedling weight. There was a general decline in seedling weight at the hours the clover seed and fertilizer were mixed for all inoculation treatments. However seedlings from the Pelinoc treatment were substantially larger. There was no benefit to using regular peat inoculant when mixing the seed with fertilizer. The Pelinoc system utilizes a special adhesive which helps protect the rhizobia bacteria as well as holding the bacteria on the seed.

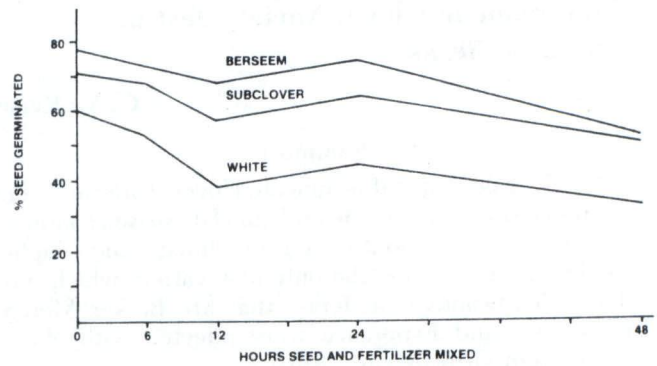


Figure 1. Response of berseem, subclover, and white clover seed germination to the number of hours clover seed was mixed with fertilizer.

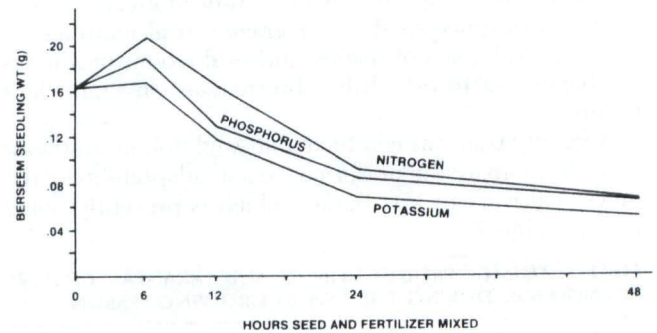


Figure 2. The effect of mixing nitrogen, phosphorus, and potassium fertilizer with berseem clover seed for varying time periods on seedling weight.

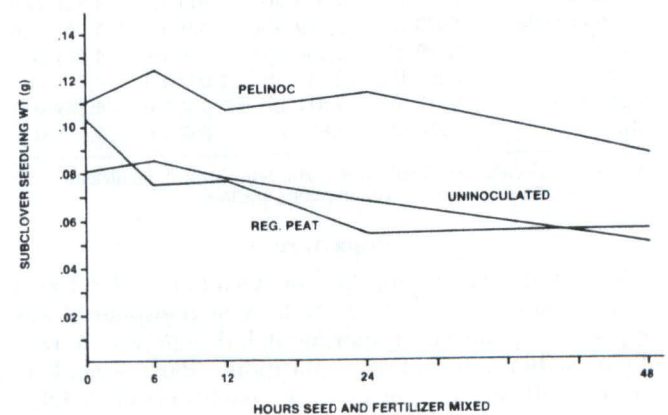


Figure 3. Response of subclover seedling weight to inoculation treatment when mixed with fertilizer for different periods of time.