Effects of Purine Nucleotide Seed Treatments on Lint Yield of Pima Cotton

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Replicated field trials were conducted at three locations in 1981 to evaluate the effects of purine nucleotide seed treatments on Pima S-5 cotton. At all three locations: Safford Station, Phoenix Cotton Research Center and Marana Experimental Farm, the purine nucleotide seed treatments tended to increase numbers of seedlings emerging per foot of row, and the vigor of these seedlings relative to controls. The purine nucleotides were applied as aqueous slurry or dry powder with which weighed quantities of acid delinted cottonseed were mixed by shaking for a 30 second interval. Seed were then quickly dried and packaged in standard paper coin envelopes preparatory to planting. Eight or sixteen replications of 100 seeds each, at each location were utilized for the purine nucleotide treatments.

The most significant differences in emergence and seedling vigor were seen at the Safford Station location with purine nucleotide treatments resulting in about a 10% better stand, and an average 10% increase in the speed of emergence - one measure of seedling vigor. The best buffered purine nucleotide treatment at this location showed 30% more seedlings emerging than control at the earliest evaluation time. Effects of buffered purine nucleotides on seedling vigor at Phoenix and at Marana were positive, but less significant than those at Safford. Since environmental conditions at these two locations following planting were quite favorable, all cotton seed germinated well, with over 80% of the seedlings emerging in many cases.

Small one meter sample replicated lint yields were taken on a limited number of tests at the Marana location. Funding limitations made it impossible to manage a complete sampling of lint yield on all plots at all locations. Although effects of buffered purine nucleotide treatments on seedling vigor were not as marked at Marana as at the Safford location, the proximity of Marana to Tucson made it the choice for lint yield measurements.

An analysis of variance contrasted the two controls: one untreated, acid delinted seed; the other treated with vitavax fungicide; and the two highest purine nucleotide concentrations (100mM stock); also one with and one without fungicide co-treatment. A highly significant F ratio was obtained; 7.89, which was significant at the 0.009 probability level. A protected LSD test revealed significant separations in the means as shown in Table 1.

Table 1. Effect of buffered purine nucleotide seed treatments on the lint yield of Pima S-5 cotton at Marana, AZ.

Control with fungicide	Control, untreated	Buffered purine nucleotide	Buffered purine nucleotide with fungicide
753 lb/A	825 lb/A	1058 lb/A	1117 lb/A

In conclusion, 1981 field studies illustrate that buffered purine seed treatments in addition to eliciting a noticable improvement in seedling emergence and seedling vigor, also enable the plant to express the beneficial effects of seed treatment as increased lint yield. Plants produced from purine nucleotide treated seed were morphologically normal, as analyses of variance revealed no significant differences in internode number and plant height compared with controls. Buffered purine nucleotide treatments appeared to render the plants more fruitful, as evidenced by the 37% lint yield advantage of the two highest concentration purine nucleotide treatments, compared to controls.

Flower Productivity of Fast and Slow Emerging Plants

Daniel Glat and B. B. Taylor

The last two years we found that plants from fast emerging seedlings yielded on an average of 15-20% more than slow emergers. There are several reports in the literature which also indicate vigorous fast emerging seedlings will usually develop into higher yielding plants than those which take longer to emerge. In order to investigate possible causes for those differences in yields, we followed the flowering of fast and slow emerging plants during the summer of 1981.

Seedlots of different qualities were planted at the Marana Experiment Station in a randomized complete block design with 8 replications. On each plot, all seedlings emerging within a week after planting were marked as fast emergers; those that broke the soil surface two weeks following planting were marked as slow emergers. Plots were hand-thinned so that selected plants were under the same competition effects. Flower productivity was then followed by tagging and counting flowers on approximately one-hundred fast and one-hundred slow emerging plants, every 2-3 days, during June, July and August of 1981.

Figure 1 shows the number of flowers accumulated each week, and Figure 2 presents the number of flower openings each week. Fast emerging plants not only produced a much higher number of flowers each week, but also started flowering earlier and reached cut-out at a later date.

In Figure 1 where the steeper part of the curve indicates a higher flowering rate, we observe that the flowering rate of the fast emergers increased rapidly the last week of June. The fast emergers maintained a high flowering rate until the first week of August. The slow emergers, as indicated by the slope of the curve maintained a high flowering rate only during three weeks of July. This trend can also be seen in Figure 2 where the number of flowers opening of the fast emergers each week was greater and extended over a longer period of time than the weekly flower opening of slow emergers. Peak flowering for all plants, occurred during the first two weeks of July.

It's clear from this data that one of the reasons that fast emergers yield more than slow emerging plants is because of their much higher flowering rate. This could be related to a more vigorous and early vegetative growth that allows the development of more flowering points.

It is interesting to recall that plants studied here originated from seedlots with very different levels of quality yet, the flower productivity of fast or slow emergers were similar and independent of the seedlot they came from. This indicates that a fast emerging seedling is a vigorous seedling and will develop into a high-hielding plant, even if it comes from a low quality seedlot. Reversely, a slow emerging seedling will probably be a low-yielder even if originated from a high quality seedlot.

The big difference between seedlots is that the lower quality seedlots produce a greater percentage of slow emerging seedlings than the higher quality seedlots.

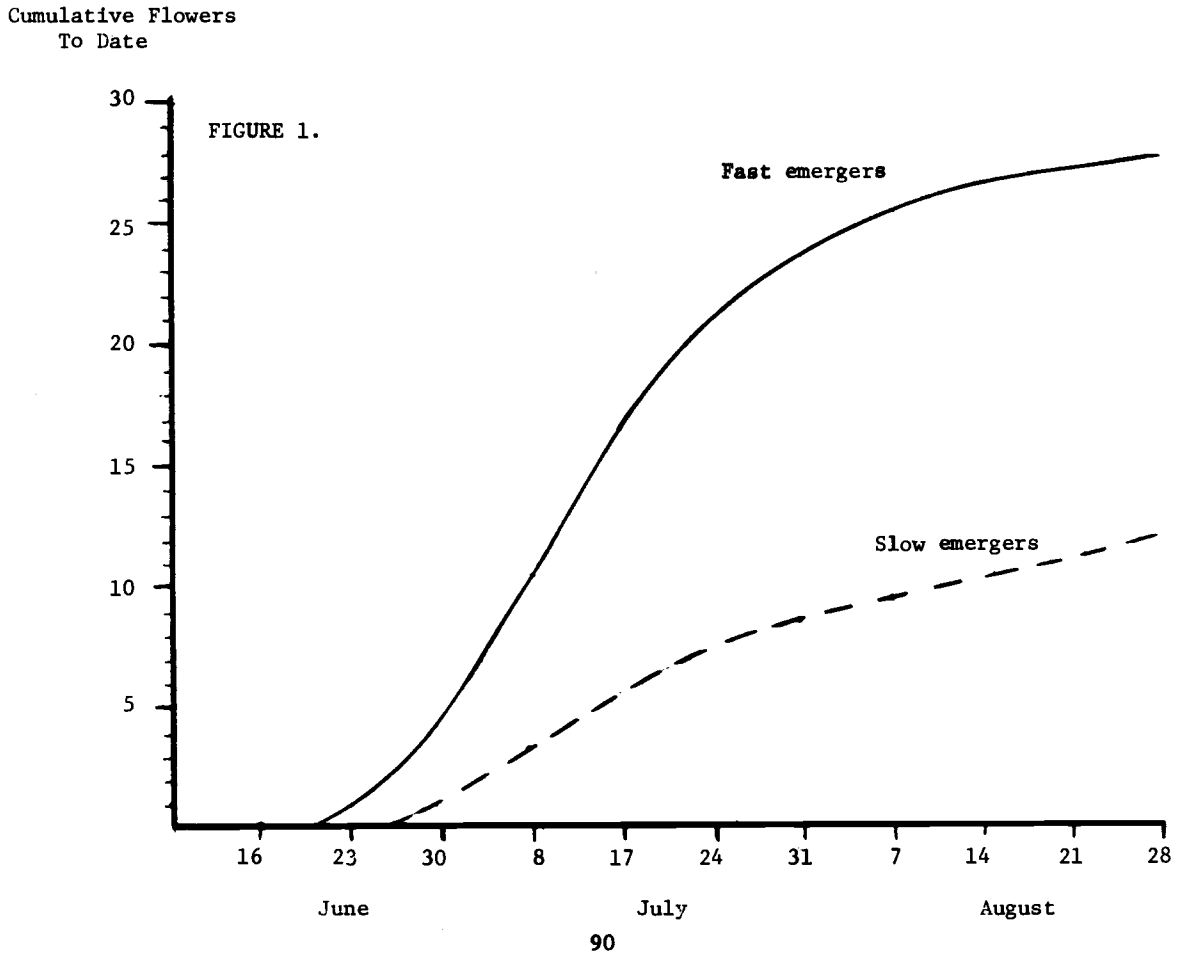

FIGURE 1.

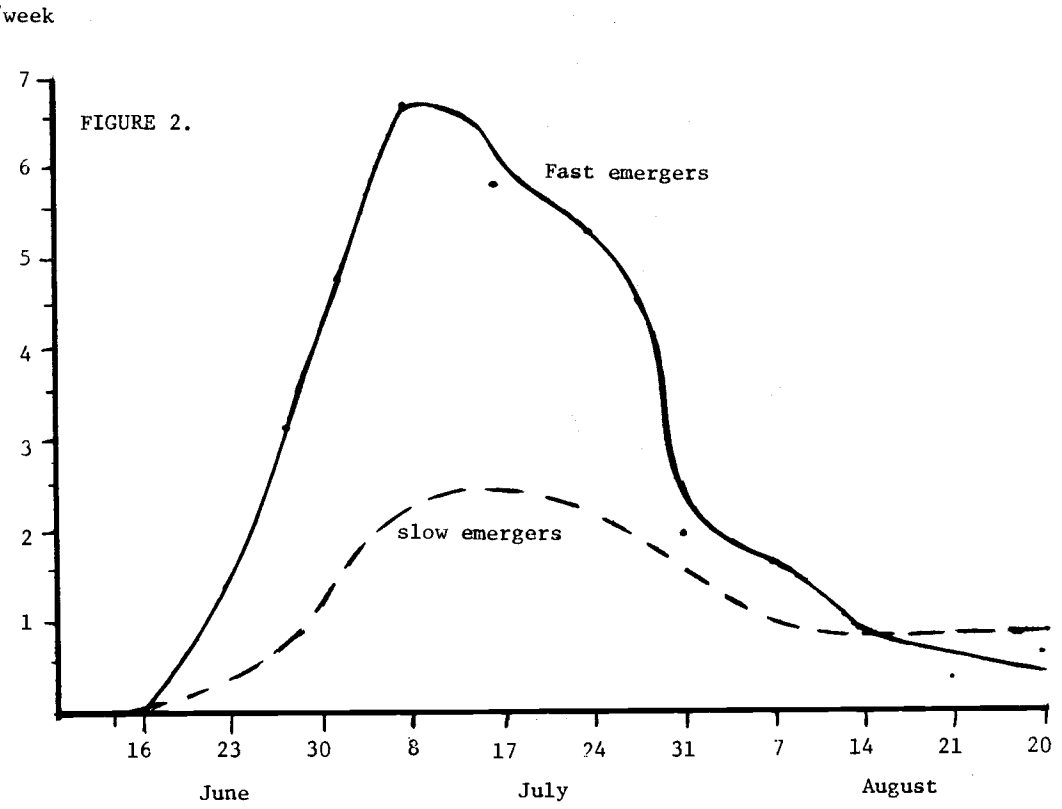

FIGURE 2.

Evaluation of Orthene Treated Seed of DPL-61 as a Control for Early Season Insects

Dale Fullerton

Summary

Evaluation of Orthene treated cotton seed as an aid in developing an efficient short season culture concluded that treated seed provided a minimal effect on insect populations with no apparent yield advantage. Although Orthene treated seed reduced certain insect numbers more than untreated DPL-61 seed, those differences were not vital to increased production. AZ7203 showed more resistance to pest populations but it did not reflect a yield increase.

Table 1 shows the insect populations or damage estimates for those insects that occurred in sufficient numbers to be evaluated. Of the five pests evaluated, Orthene treated seed plots had fewer numbers in three of those; flea beetles, spider mites and thrips. AZ7203 had fewer numbers in four of the pests than did DPL-61 or the Orthene treatment.

Spider mite populations were undoubtedly too light to properly evaluate. Although beet armyworm numbers were not large and probably not conclusive, consistently higher numbers in the Orthene treatment would indicate that effective control was not being achieved.

Total yields, shown in Table 2, indicate that the differences in pest populations were not reflected in increased yields. No significant difference occurred between the 3 treatments. In addition, early yields taken on Sept. 15 and Oct. 16 did not show that Orthene treated seed produced early maturity as no differences occurred on either of those harvest periods.