THE IMPORTANCE OF PROVADO FOR EARLINESS MANAGEMENT IN COTTON

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Abstract

Gaucho seed treatment or Temik at-planting provided excellent plant protec-tion from thrips damage. Fewer aphids were detected in the Gaucho seed treatment than any other at-planting plot. The addition of Provado foliar sprays resulted in earlier crop maturity and increased lint yields.

Introduction

Early season insects including thrips, aphids and plant bugs frequently infest cotton beginning at emergence and continuing into early squaring. Thrips injury to cotton can result in stunted plants and crop delay when numbers of the pest are sufficiently high, thus thrips control can be an important consideration in managing a cotton crop for earliness (Studebaker, et al. 1995). The good effect of Gaucho seed treatment for protection from thrips injury has been demonstrated by Almand, 1995. At-plant treatments, such as Temik in-furrow or Orthene seed treatment, alone may not provide maximum protection from early season pests. Additional cotton yield was obtained by Burris, et al 1994 when presquare treatments of Monitor were applied foliarly to plots receiving at-plant treatments.

Yield reductions due to what might be considered low infestation levels of cotton aphids was reported by Harris, et al. 1992. High numbers of aphids have been shown to reduce fruit retention, affect plant growth as well as reduce yields (Fuchs and Minzenmayer, 1995). Imidacloprid foliar treatment has shown good effect on aphids, plant bugs and other sucking pests (Mullins and Christie, 1995). The efficacy of Gaucho seed treatment in conjunction with imidacloprid (Provado) foliar applications to provide extended plant protection needed to be determined .

Method and Materials

A field trial was conducted at the Bayer Research Farm, Benoit, MS to determine the insect control and plant response of Provado applications to cotton receiving Gaucho or Temik at-plant treatments. A split plot design was utilized with main plots consisting of an Untreated Check, Gaucho seed treatment at the standard commercial rate of 4.0 oz ai/cwt and Temik in-furrow at a commonly used rate of 0.53 lb ai/Acre. Each main plot was subdivided into 4 plots treated with Provado as a broadcast foliar spray @ 0.047 lb ai/A (3.75 fl.oz/A) according to one of the following four alternatives: 1) Provado applied at Node 5 growth stage, repeated at Node 7 and Node 9; 2)Provado applied at Node 7 & Node 9; 3) Provado applied at Node 9 only; and 4) No Provado application. Plant growth during the period was such that the applications were made at 7 day intervals, June 9, 16 and 23.

Plot size was 20 (38") rows 300 feet in length with 2 replications. Plots were planted May 11 to Delta and Pine Land 50 cottonseed using standard grower equipment with Temik being applied at planting with Max-Emerge granular boxes. Gaucho seed treatment was applied by Gustafson. Foliar applications of Provado were made using a broadcast spray boom equipped with cone nozzles spaced 18" apart delivering 5 GPA under 60 PSI.

Aphid infestation levels were determined by examining the first fully expanded leaf down from the terminal on 25 randomly selected plants per plot. Sampling for other insects involved plant inspections, sweep net or vacuum sampling. All plots were oversprayed for bollworm/tobacco budworm control with Baythroid + Bolstar on an as-needed basis which began in late July. No insecticide applications were made to any of the plots after the last Provado application on June 23 and prior to the worm applications in late July. The entire plot area was furrow irrigated on August 1 & 2 and again approximately 2 weeks later.

Yields were determined using a standard commercial cotton picker harvesting 300 feet of row on 12 rows per plot and weighing the amount of seed cotton collected. Yields were converted to pounds of lint based on actual gin turnout of 5 bales ginned at a commercial gin.

Results and Discussion

Thrips infestations were heavy and persistent resulting in severe damage in untreated check plots. As in past years' tests, Gaucho and Temik provided excellent protection from thrips injury permitting good initial plant growth. Cotton aphid *Aphis gossypii* Glover populations increased until heavy rains occurred on July 5, afterwhich the populations crashed. As shown in Figure 1 the highest levels were in the Untreated Check, while the Gaucho seed treatment had the lowest overall numbers of aphids. Multiple Provado applications following Gaucho seed treatment resulted in the fewest number of aphids of any treatment. The multiple applications of Provado in each of the main blocks, Untreated, Gaucho & Temik, all resulted in fewer aphids when compared to corresponding no Provado or one application of Provado applied at Node 9 only.

Plant bugs were a pest anticipated to infest the cotton beginning at early squaring, but numbers never reached sampling detection levels and certainly not threshold levels.

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No other insect pests were detected in substantial numbers after aphids and prior to Heliothines in late July.

Plant mapping data (Figure 2) collected July 7, approximately 8 weeks after planting, showed better plant growth in the Gaucho and Temik treatments compared to the Untreated Check. Much of the difference in size is likely due to thrips damage in the untreated plots.

Square set information collected at that same time indicated some very good responses from the insecticide treatments. Figure 3 shows a good increase in fruit set from 3 applications of Provado in the Gaucho and Temik blocks, both in initial and sustained fruit set. Two applications and even one application of Provado (Figs. 4 & 5) show this same trend of increase square set in the Gaucho and Temik blocks compared to no at-planting protection. Where only Gaucho or Temik (no Provado) are used (Figure 6) there is an increase in early square set compared to no early plant protection, but that advantage decreases as plant development continues.

Added and sustained fruit set in later nodes occurred when Provado was applied in the Gaucho plots (Fig. 7). There is a similar trend in the Temik treatment, Figure 8; however, where there was no early plant protection (Figure 9) the response from Provado was not as dramatic. The fruiting curve in Untreated main plots was also much more symmetrical than that shown in the previous 2 graphs. These data demonstrate the importance of protection from insect damage beginning at emergence. Provado provided good protection and plant response when the plants were given a good start.

This good response to earliness was evident as the crop matured. Nodes above cracked boll determinations made September 8 showed very good maturation in the Gaucho and Temik plots, Figure 10. Particularly in the Gaucho treatments, each application of Provado tended to increase crop earliness. While this same trend for earliness with Provado treatment was evident in the Untreated, the late start to fruiting apparently could not be overcome by Provado applications. The relative aphid infestation levels in the various treatments shown in Figure 1 and crop maturity in Figure 10 are noteworthy.

The crop was allowed to mature with percent open bolls determined on September 26. The same trends continued for Gaucho and Temik having a substantially higher percentage of bolls open than the Untreated Check, Figure 11 . Provado applications in the Gaucho and Temik plots showed a trend even at that time for an increase in maturity and slightly more open bolls. In the Untreated plots, Provado applications increased earliness with each application, but was not equal to the early plant protection plots, Gaucho and Temik.

Final plant maps at harvest show a good increase in boll set with Provado applications during peak fruiting. This was particularly evident in the Untreated block as shown in Figure 12 where 2 and 3 applications of Provado showed substantial increases in early boll set. The Node 9 application only was apparently too late to overcome the setback from no plant protection early.

The final plant map for Gaucho, Figure 13, shows an overall skewness to the lower nodes, indicating good early boll set and exactly the profile needed for early maturity with good yield. The applications of Provado in this regime showed good increases in early fruiting nodes, even with one application of Provado at Node 9.

Boll set for plots receiving 3 or 2 applications of Provado showed a good trend for earliness with a high boll set on the lower nodes, Figs. 14 & 15. Gaucho and Temik had higher fruit set than the Untreated in these treatment programs.

Plots receiving only one application of Provado revealed slightly different results as shown in Figure 16 where there were greater differences between the Untreated and Gaucho or Temik. The one application of Provado at Node 9 was much more beneficial in the Gaucho and Temik treatments than where the plants had no early protection.

In plots that received only the early protection of Gaucho or Temik and no Provado applications the harvest plant map, Figure 17, showed the increase in boll set on the lower nodes, but by peak fruit set the response was no longer as evident.

The amount of cotton picked is the final and perhaps more important analysis and that as well shows good result from the early plant protection. Figure 18 shows the combined yield of sub-plots within each of the main blocks. Gaucho and Temik, including Provado applications, provided excellent lint yield increases over the Untreated Check. In the Gaucho blocks, Figure 19 there was little difference in the 1, 2 or 3 applications of Provado. All gave yield increases slightly over 200 lbs. of lint. In the Temik blocks, each application of Provado provided a yield increase of 64-68 lbs. of lint. The sequential and additive applications of Provado were apparently important in the Temik treated cotton.

These data show the importance of plant protection beginning at plant emergence for adequate protection from heavy thrips infestations. Jenkins, et al. 1995 reported that first position bolls can account for 73.8% of the lint yield with highest value lint produced on nodes 6-18. In this trial the good protection from thrips and maintaining low populations of aphids was apparently very important for good yields and promoting earliness in the cotton crop. Gaucho and Temik provided similar results in many of the evaluations and always much better than the Untreated.

The crop protection obtained from Provado was quite evident and very beneficial. The plant and insect response obtained with Provado was better where there was some initial plant protection with either Gaucho or Temik.

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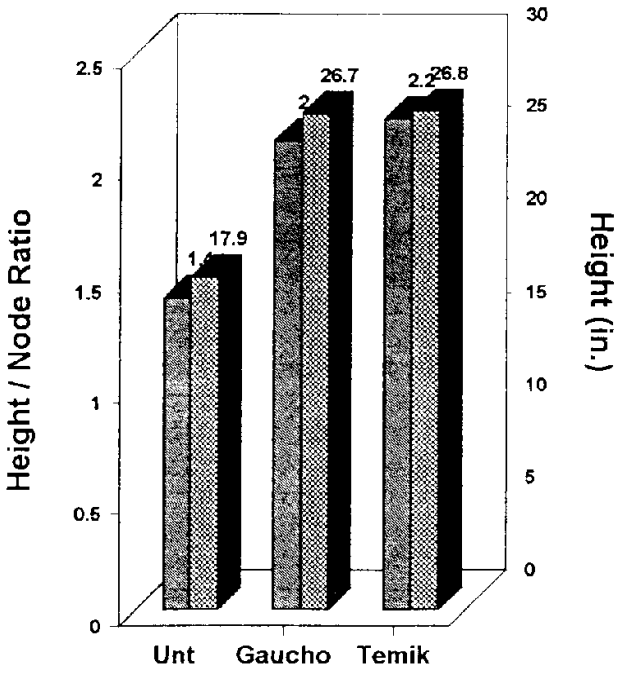

Fig. 2. Early season plant size.

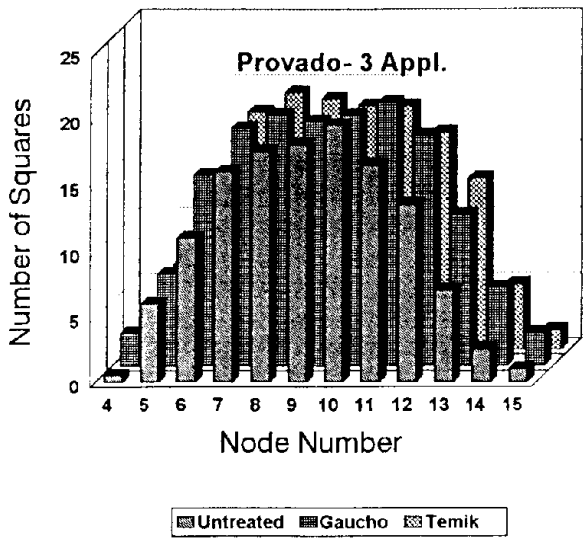

Fig. 3. Early season square set following Provado (3 appl.).

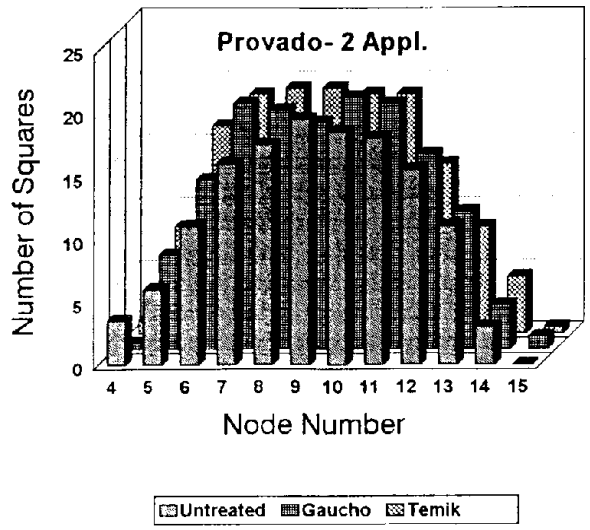

Fig. 4. Early season square set following Provado (2 appl.).

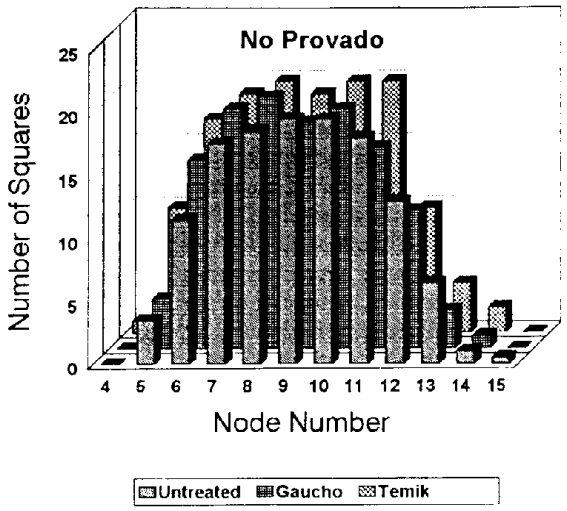

Fig. 6. Early season square set without Provado.

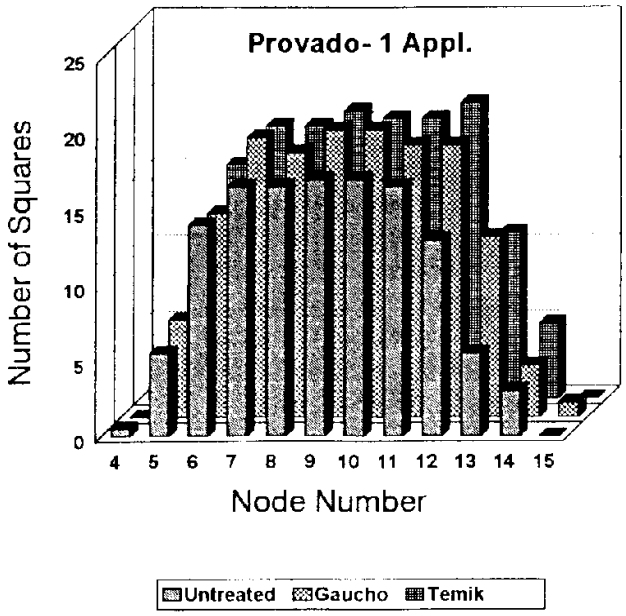

Fig. 5. Early season square set following Provado (1 appl.).

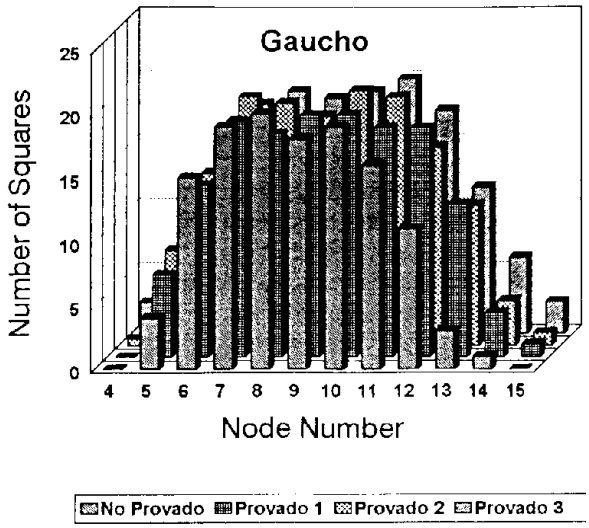

Fig. 7. Early season square set for Provado following Gaucho.

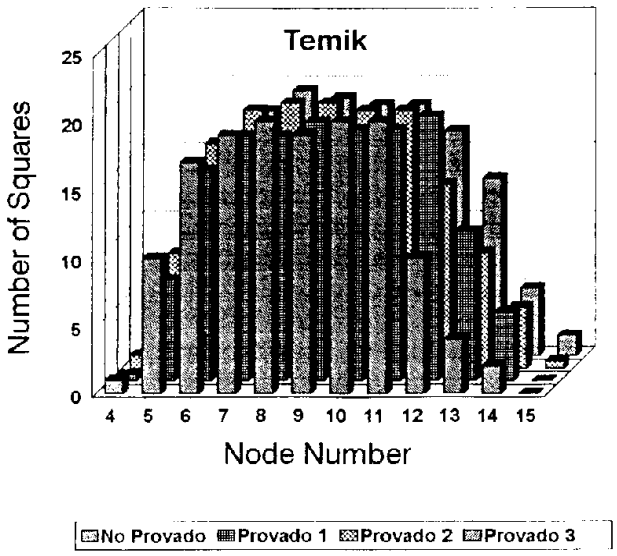

Fig. 8. Early season square set for Provado following Temik.

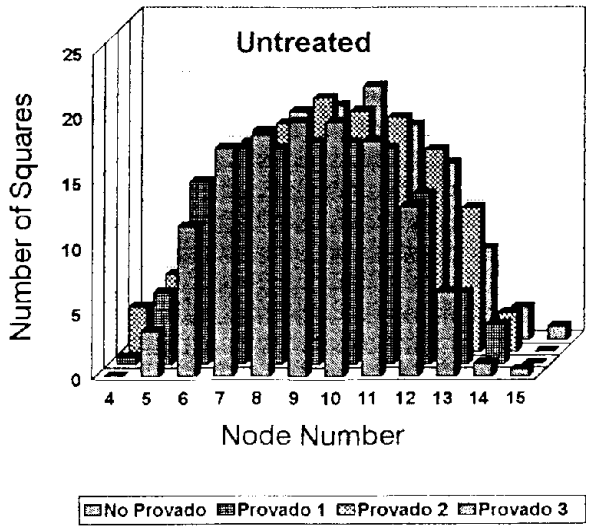

Fig. 9. Early season square set for Provado without at-planting insecticide.

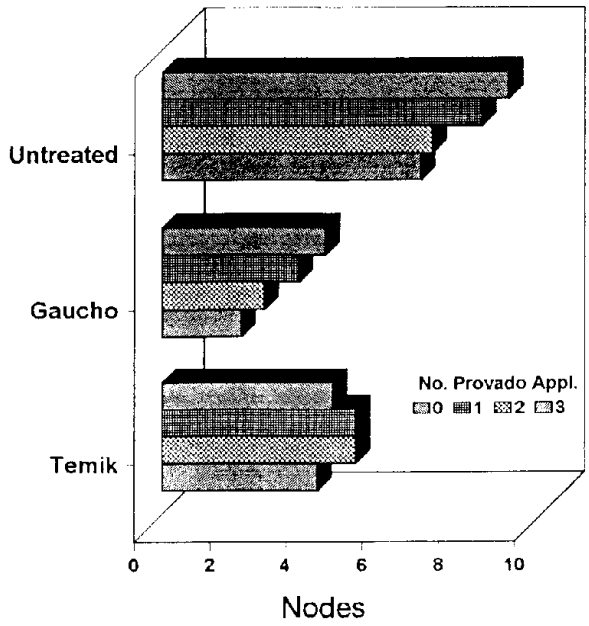

Fig. 10. Nodes above cracked boll following Provado.

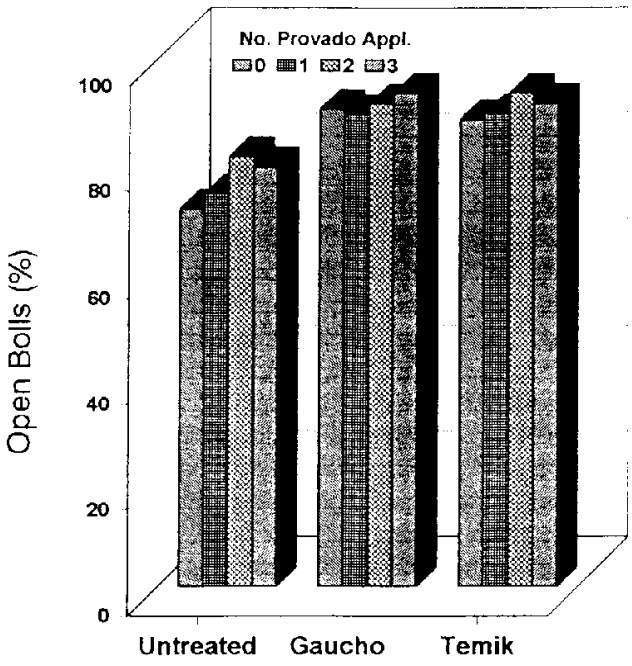

Fig. 11. Open bolls following Provado.

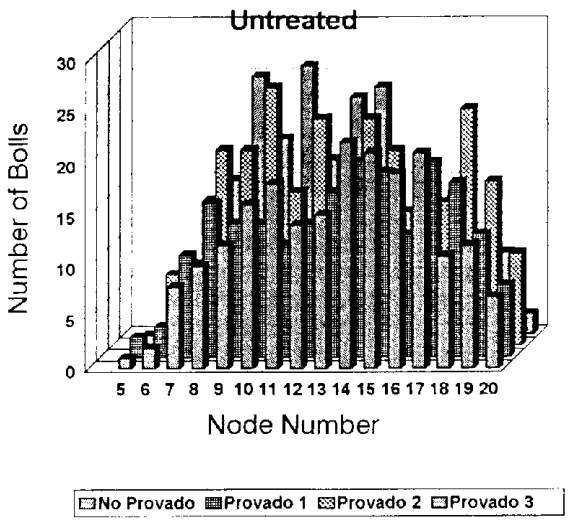

Fig. 12. Boll set at harvest without at-plant insecticide.

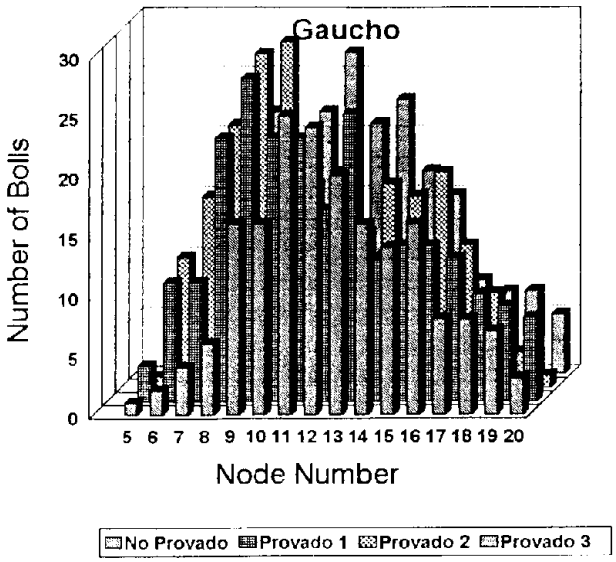

Fig. 13. Boll set at harvest with Provado following Gaucho.

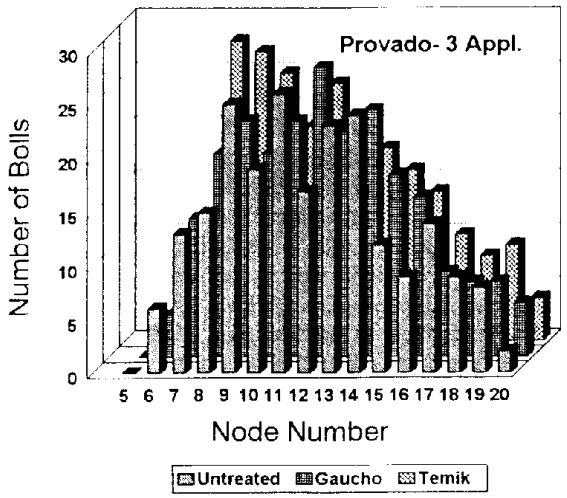

Fig. 14. Boll set at harvest following Provado (3 appl.)

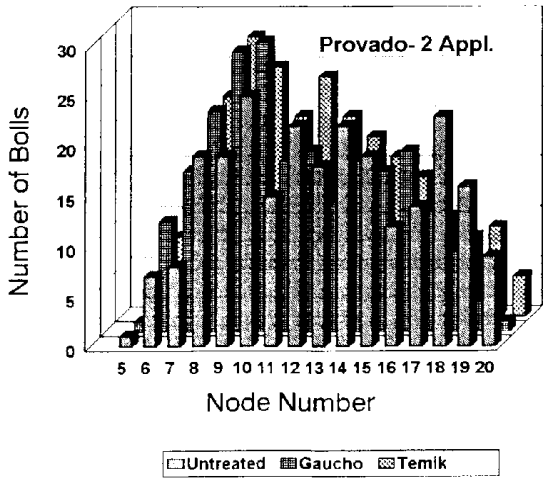

Fig. 15. Boll set at harvest following Provado (2 appl.).

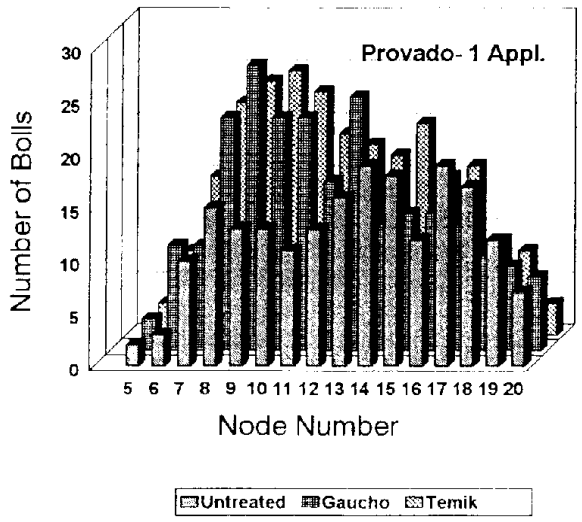

Fig. 16. Boll set at harvest following Provado (1 appl.).

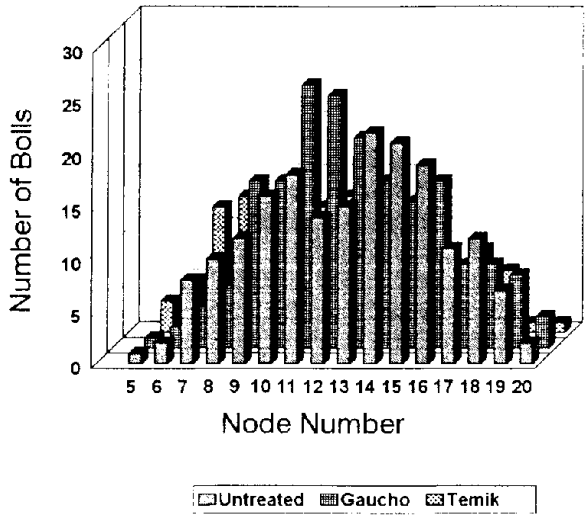

Fig. 17. Boll set at harvest without Provado.

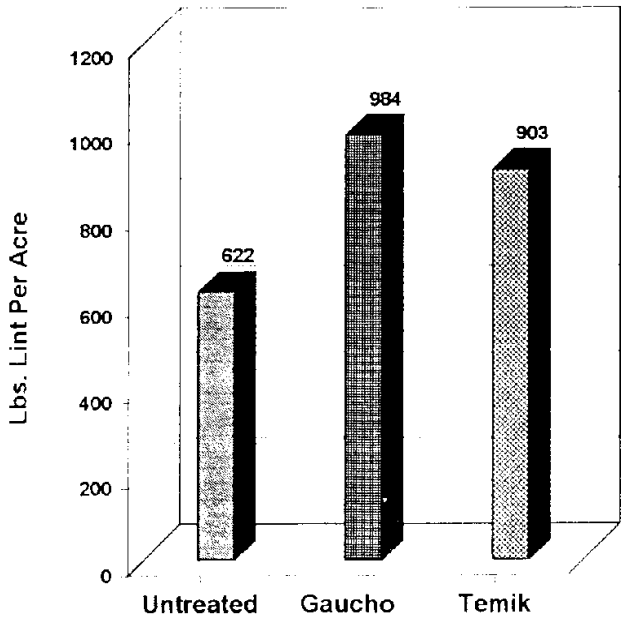

Fig. 18. Yield averaged across Provado treatments.

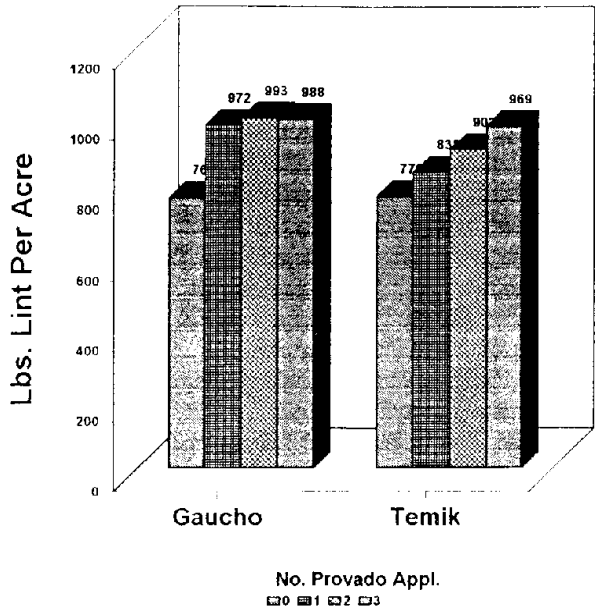

Fig. 19. Yield for early season Provado treatments following Gaucho and Temik.