X:\ENGLISH\RECORDER\90\JUNE

*Where X = the drive letter of the CD-ROM

june1	Introduction
june2	Cotton Testing Conference in Bremen
june3	Benefits of Thrips Control
june4	Cotton Sowing Under Plastic: Some Observations from Spain
june5	More About Cotton Drying in the Gin
june6	Short Notes
june7	A DIALOG Search on Boll Weevil Research

Introduction

This second issue of *The ICAC Recorder* in 1990 contains a report on the recent meeting of the International Committee on Cotton Testing Methods under the auspices of the ITMF. During this meeting, participants from both the cotton spinning industry and some major cotton testing laboratories discussed the new developments in cotton testing instruments and protocols. Evidently, the discussion focussed on the major problems in cotton fiber quality these days: stickiness, fineness/maturity, short fiber content, and HVI testing. In all these areas new technologies are emerging at a fast speed.

In other articles attention is given to the practice of sowing and germination of cotton under strips of plastic, and the treatment or nontreatment of early season thrips. The underlying issue is earliness. Sowing under plastic, as it is practiced in Spain, could lead to a twenty-day gain in maturity. The issue of treating for early season insects is strongly related to the question whether the plant has time enough to replace lost squares later in the season. Obviously, very early varieties have less ability to do so. In

many parts of the world the virtues of earliness seem to gain more and more importance in the decision-making process of farmers. The reasons are reduced costs of pest control, less danger of late season unfavorable weather, and better yielding early maturing varieties now available.

The 49th Plenary Meeting of ICAC will be held in Montpellier, France. In cotton circles the city of Montpellier is known for the Institut de Recherches du Coton et des Textiles Exotiques (IRCT), which since its creation in 1946 has made a significant contribution to cotton research in many parts of the world. Participants in the Plenary Meeting will get ample opportunity to visit the laboratories of this prestigious institute.

At the occasion of the Plenary Meeting the Technical Information Section of ICAC will publish a document titled *Current Research Projects in Cotton.* This document will contain short descriptions of research projects in cotton, subdivided by discipline. In addition, it will carry an index of research institutes and research leaders related to these projects. To be able to compile this information in an accurate fashion we are relying on many key researchers in cotton producing countries. Elaborate questionnaires have been sent out to some readers of *The ICAC Recorder,* and we

greatly appreciate their time and effort spent on this project. We feel confident that with their assistance we will produce a very useful publication.

Cotton Testing Conference in Bremen

The International Committee on Cotton Testing Methods operating under the auspices of the International Textile Manufacturers Federation (ITMF) discusses emerging cotton testing technologies, promotes comparability in testing cottons by recommending standards and test procedures, and advises on further research in this field. The Committee counts about 75 professionals involved in cotton testing, both commercially and for scientific purposes. It is organized in five working groups each having its own chairman. The fields of interest in these five working groups are fiber maturity, stickiness, HVI testing, fiber length and trash/dust. The full Committee meets every two years in Bremen, on the occasion of the International Cotton Conference. Following is a brief report of this two-day meeting with emphasis on the "hot" issues: maturity, stickiness and HVI-testing. The full proceedings of the meeting will be available from the International Institute for Cotton at a still unknown date.

Maturity

In the field of maturity, there is an increasing interest from the textile industry to find a quick, reliable method to be used in association with an HVI-line. Maturity is most important to assure a satisfactory and regular dye uptake and is also strongly associated with the frequency of neps (in case of immature cottons). One problem area related to the accurate measurement of maturity is the fact that a true fundamental measurement of maturity (the relative thickness of the secondary cell wall) can only be done using a light microscope. All other methods have their limits as reference levels of maturity. A method using video-image scanning for measuring wall thickness is under development in New Orleans and might possibly evolve in a good basic reference for maturity.

At present, the Shirley Fineness/Maturity Tester (FMT) is the most widely accepted method to estimate fiber maturity of a cotton sample. But the apparatus has its limitations, as the results of round-tests indicate that the consistency of measurements is less than required (probably due to sample preparation) and the time for sample preparation is not compatible with high speed testing of cotton samples. Also, the results seem to differ ac-

cording to the method of ginning (saw or roller) and according to the processing stage (raw cotton or sliver). This indicates that the results are influenced by the fiber configuration in the sample. Some laboratories have integrated the FMT in their HVI-line and are presently evaluating the feasibility of this setup.

An alternative to the FMT is the Near Infrared Spectroscopic Method, which is still under development. This method is based on the principle that mature cottons have a different absorption/reflection spectrum than immature cottons. The machine will be able to test a sample on maturity in less than one minute, including sample preparation. The results do correlate satisfactorily with the maturities, as measured by the video-scanning method developed in New Orleans as well as with the FMT machine. The method needs more testing with a wide range of combination of cottons of different maturity and fineness to assure that, indeed, maturity is measured and not some derivative of micronaire. Yet another approach to the problem is to bypass maturity completely and study directly the nep content and dyeability of the cottons. In this respect, quick web/nep tests and rapid tests for dyeability are being developed and tested.

Professor Ducket of the University of Tennessee presented research to develop a new method to determine fineness/maturity based on the principles of the old Arealometer but modernized using computer technology. Maturity and fineness are determined by directing a semi-continuous air flow through a 3 gram specimen of raw cotton. Results so far correlate satisfactorily with the Arealometer. More research was recommended to see if the method correlates well with the newer fineness/maturity test methods.

To overcome the problem of calibration of maturity-measurement instruments, the chairman of the working group, Dr. Thibodeaux of USDA-Southern Region Research Center in New Orleans, proposed to prepare a set of calibration cottons covering a range of maturity and fineness values. Thoughts go to a set of 12 to 15 cottons which will serve research purposes. It was suggested that these cottons would be grown especially for this purpose by spreading out both sowing period and harvesting period. In order to calibrate any fineness/maturity tester, the chairman estimated that some 50 different cottons should be needed representing a wide range of fineness and maturity combinations. Such a set of cottons would be used for a round test to maintain "standard" fineness/maturity testers on the

same level. It was suggested that representatives of trade laboratories using FMT testers could cooperate in forming this set of calibration cottons.

Stickiness

Honeydew related stickiness in cotton is on the increase and is experienced in almost every corner of the cotton world. At this moment there is no quick and reliable test available to detect stickiness. Most interested parties depend on either a chemical test on sugar, which has its limitations in terms of reliability, and the minicard test, which is of course rather slow.

The chairman of the working group on stickiness, Dr. Henry Perkins of Clemson, South Carolina, proposed a set of descriptive grades to classify the results of the minicard with the objective of enhancing the comparability of the measurements on these machines. In total, four descriptive grades are distinguished. This protocol was accepted by the Committee.

New information was presented about the Thermodetector for measuring stickiness developed by IRCT in Montpellier. New experiments with this device indicate that instead of three repetitions per sample, two repetitions

are sufficient to obtain stable results. In addition, the operator could limit himself by counting the sticky spots on only one side of the double-sided aluminum foil. Total testing time per sample could be reduced from 12 minutes to 8 minutes if both these measures are put into effect. According to Dr. Gutknecht, one of the designers, there are presently about twenty machines in operation.

Methods to reduce the incidence of stickiness include agricultural technologies to control honeydew secreting insects and post-harvest treatments to clean-up the cotton. Concerning the first category, it is generally accepted that no short-term solution for the problem is yet in sight. Progress is made by breeders to develop resistant varieties combining okra leaf with glabrous leaf characteristics. In the field of plant protection, interest is focussed on methods of biological control, combined with intelligent use of pesticides.

Concerning ways to alleviate the stickiness problem after harvesting, the Shenkar Institute in Israel informed the Committee of the benefits of steaming cotton in a steaming autoclave during the ginning process. Stickiness was reduced considerably by this technology. Further research should indi-

cate whether this reduction was obtained because of dilution or because of some other unknown effect. Other promising results were obtained by heating the cotton in the textile mill before it was spun. It is hypothesized that heating causes a chemical reaction which transforms the sugars into non-sticky products. Best results were obtained by contact heating. Tests indicated that fiber properties are not adversely affected by this type of heating. Some discoloration occurs, but after washing and bleaching normal whiteness was regained. A patent has been obtained for this technology. A third line of research focuses on the possibility of using microorganisms for eliminating the sugars while the cotton is in storage. It has been shown that under humid conditions such microorganisms are effective, but the level of humidity is detrimental to other fiber characteristics.

No new information was presented on the near-infrared method of measuring stickiness. The working group encouraged those involved in developing this machine to increase their efforts in this direction. The method is viewed as having good potential to be used eventually in an HVI-type of situation.

HVI Testing

In the HVI working group, chaired by Lawrence Hunter of South Africa, discussions centered around the issue of calibration and the related comparability of test results. Most controversy is aroused by the measurement of strength. In the USA, the strength units in HVI lines are calibrated to reflect Pressley levels. Expressed in grams/tex., these values are higher compared to those resulting from the Stelometer measurements. This, of course, reflects the different methods to break a beard of fibers used by these two laboratory instruments. The difference is not linear and cannot be adjusted by a single correction factor. In Europe and other countries outside the USA, the industry is used to Stelometer values and generally calibrates HVI machines reflecting these levels. It should be remembered that the HVI procedure to measure strength differs from both Pressley and Stelometer, especially since it estimates sample weights rather than measuring them directly. To make things even more complicated, the two manufacturers of HVI machines have opted for different methods to estimate sample weight.

In practice, the divergent needs of the US and European spinning industries concerning strength calibration levels has led to the use of the International Calibration Cottons for calibrating most HVI machines outside the USA, and the specially developed HVI calibration cottons for the machines operating in the USA. The latter come in a set of two, a long and a short cotton, and provide values for Upper-Half-Mean-Length (UHML) and Mean-Length (ML), and HVI strength (Pressley level). Micronaire would be calibrated using separate calibration cottons.

The present situation obviously causes confusion and is unacceptable in a modern marketplace where correct and unequivocal information is essential. In addition to the above considerations, the use of the International Calibration Cottons for calibrating HVI lines in commercial operations has apparently led to a substantial decline in the available stocks of these cottons. Originally intended to calibrate laboratory instruments only, these cottons (prepared by the USDA under direction of the International Committee on Cotton Standards) are not produced in substantial quantities, and existing stocks will be depleted in a few months. Although there is a commitment on the part of USDA to continue to produce these cottons, they

have reservations about making these available for use on HVI lines. Only HVI calibration cottons would be available for this purpose.

Informed about these facts, the Committee accepted the measures of UHML and ML as the relevant length measurements, and the Pressley-level calibration for the strength measurements. Alternatives, such as producing a now set of "International HVI Calibration Cottons" by an European Institute, were deemed not feasible. However, it was strongly suggested to the international research community that it develop a new reference level for the strength measurement, based on fundamental breaking strength divided by mass. This would ultimately replace the present system and would move HVI strength levels away from both Stelometer or Pressley.

Apart from the issue of calibration, also other factors have a significant impact on the comparability of HVI measurements. In a paper to the Committee, Dr. Charles Bragg of Clemson, South Carolina, reviewed some of these factors. Some are related to cotton itself, such as the degree of openness of the sample as well as its "preparation" (degree of smoothness). Generally, more open cottons and cottons with a better "prepara-

tion" give more accurate results. The same holds true for cottons having been subjected to one or more stages of lint cleaning at the gin. Also, saw ginned cotton seems easier to test and gives more reliable results than roller ginned cotton. Finally, a high trash content and high moisture content are considered negative factors in obtaining accurate test results.

The HVI quality control program, conducted by the Agricultural Marketing Service of USDA, has generated a substantial database on the repeatability of HVI measurements. In this program, 10 percent of the daily tested samples in each of twenty USDA classing offices are retested in the Memphis offices of USDA-AMS. In the following table an indication is provided about the degrees of repeatability of various measurements.

Degrees of Repeatability by Type of Measurement

Test	Acceptable Range	% Within Acceptable Range
Upper Half Mean	± 0.02 inch	72%
Uniformity Index	± 1 unit	62%
Strength	± 1 gram/tex	60%
Micronaire	± 0.1 unit	72%
Color: Rd	± 1 unit	81%
+b	± 0.5 unit	75%
Trash	± 0.1 unit	75%

It is expected that with the expansion of HVI testing for classing purposes in the USA from 1991 onwards, data obtained from this program will be an essential source of statistics on HVI reliability and will provide a way for building confidence in HVI measurements.

Another much discussed subject regarding HVI testing is the impact of changes in relative humidity of the test environment on the measurements. Although no detailed data are available, it could be heard from various sources that substantial and sometimes exorbitant investments have been made in climate-regulation devices to achieve acceptable levels of reliability. Dr. Preston Sasser of Cotton Incorporated, Raleigh, North Carolina, made a short presentation on experimental work to measure the precise influence of relative humidity on fiber quality parameters as measured by HVI. For these tests, the relative humidity (RH) of the air was varied in cycles of 12 to 14 minutes, and highly sensitive humidity sensors were integrated into the HVI system. The results show that, contrary to what was expected, micronaire was only slightly sensitive to RH. A coefficient of variation of 2.7 percent was obtained. Strength readings did show a distinct relation to RH. For a 10 percentage point gain in RH the increase in strength was about 2 to 3 g/tex. Very little time-lag was observed between changes

in RH and the strength readings, though it appeared that strength followed RH more closely when humidity was falling. Also the elongation readings seemed to vary with RH but the pattern was less defined due to the already lower repeatability of HVI elongation readings in general. In a follow-up test the actual gain in humidity of the fibers was measured using a microwave oven. It was determined that a change from 51.5 percent RH to 60.8 percent RH over a period of 4 minutes and 16 seconds led to an increase in moisture content from 6.0 to 6.7 percent and a corresponding increase in strength from 26.6 to 27.8 g/tex.

In other work on the quality of HVI measurements, the point was raised about the effect of micronaire and maturity on the degree of correlation between HVI strength and Stelometer-measured strength. In experiments conducted at IRCT in Montpellier, France, Dr. Justin Gutknecht found that the explained variance in HVI strength increased from 85 to 95 percent if, apart from Stelometer strength (or Pressley strength), other fiber measurements were included in a linear multiple regression equation, such as 50 percent span-length, elongation and percent maturity. The same type of analysis showed that Stelometer 1/8" estimation can be derived from HVI strength by adding correction factors for standard fineness, HVI elonga-

tion, HVI micronaire and HVI length. By adding these factors, total R^2 could be increased from 84.9 to 93.1 percent.

Fiber Length

In the field of fiber length, no new major developments were reported. A round test organized by the chairman, John Curren of Glasgow, U.K., led to disappointing results, probably reflecting the influence of manual sample preparation. Most of the attention in this group remains focussed on the development of a quick method to estimate short fiber content. Not enough information was available on the procedure used in the HVI machines to derive short fiber content, so no opinion was formed. The Committee repeated its opinion that any measure for SFC would have to correlate well with the results of the Almeter, the most appropriate reference method presently available. Both in the case of general length measurements arid SFC, improvements can be expected from the Advanced Fiber Information System (AFIS), based on the measurement of loose single fibers. Although commercially available, the system is not yet compatible with commercial sample testing.

Trash/Dust

Improvements were reported in the Hollingsworth Trash Tester (formerly referred to as ITV tester). Two other instruments, the Shirley Trash Separator and the MTM Tester remain under study by the Committee. So far, it has been difficult to obtain comparable results using these three instruments. Further work in this field will focus, apart from absolute measurements of trash and dust, on the cleanablilty of the cottons.

Benefits of Thrips Control

Thrips are considered to be one of the most prominent early-season insect pests on cotton. In a survey conducted by ICAC, thrips were rated among the five major early season insect pests in thirteen out of twenty five countries. Although under certain conditions thrips infestation can also cause major damage later in the season, in most cases economic damage is confined to the first sixty days after planting. Thrips already may have severely damaged cotton in the cotyledon-stage, thereby causing irreversible plant deformations. Later, thrips will feed on leaves, in extreme cases causing leaf desiccation, and subsequently on squares, ultimately leading to square abscision.

In a multi-year study in Arizona conducted by Dr. Jack Mauney, it was found that thrips damage caused on average 17 percent of the recorded shedding in the first five weeks of squaring. In the same period *Lygus* bugs accounted for about 73 percent of shedding. Later in the season *Heliothis* and plant stress became important factors, while thrips damage became in-

significant. *Lygus* bugs however remained an important cause for square shedding.

Thrips control might start with a seed treatment of acephate and disulfoton. However, in most areas thrips are controlled either routinely or on the basis of an economic threshold with an in-furrow treatment with carbamates like carbofuran or aldicarb. Alternatively producers might opt to control thrips with foliar spraying of organophospates. In this respect, monocrotophos, propenophos and dimethoate are the most common active ingredients used according to an ICAC survey on pest control strategies in 1985. Economic threshold levels vary according to species, variety and location. According to the same ICAC survey, Pakistan authorities have set the threshold at 8 to 10 individuals per leaf (*Thrips tabaci* and *Scyrtothrips dorsalis*), Egyptian entomologists advise to start chemical control programs at 8 to 12 thrips per leaf (*Thrips tabaci*), and in Argentina thresholds were set at 2 to 3 per leaf (*Caliothrips brasiliensis*) or 50 to 100 per 100 leaves (*Frankliniella paucispinosa*).

Control programs for thrips should be evaluated in the wider context of an early season insect control program. In the last few years much discussion

in the entomological field has focussed on this issue. The essence of the debate is whether it is advisable to delay control programs and give up some early squares and count on replacement by squares later in the season. The advantage would be lower insect control costs, lower risk of reducing the population of predators on mid-season insect pests, and lower risk of developing resistance in sucking pests against the active ingredients employed.

Against this proposition it is argued that, although cotton does have compensating ability for lost squares, it is questionable if the late squares represent as much economic value as the lost squares. It is now well established that, especially with the early maturing varieties, the early bolls constitute significantly more value added (a combination of quantity and quality) than the late bolls. A reduction in square abscision caused by thrips or other early insects will also result in a more evenly maturing crop. When cotton is machine harvested, harvesting efficiency and commercial yields will improve. Also, it is claimed that early season insecticide applications are less costly than eventual late season sprayings because the chemicals can be better directed and ground equipment can be used.

Unfortunately there are hardly sufficient data to reach conclusive producer recommendations regarding this issue. Obviously, there are a few circumstances which would lead producers towards one proposition or the other. In situations where earliness is an overriding factor, early-season aggressive control of thrips seem more appropriate as the value of the early bolls weighs more heavily in the total returns. In situations where outbreaks of secondary posts are feared or where there is an overriding interest to reduce the total insecticide bill, one would tend to delay applications and rely on natural predators.

In a study by Carter, Tugwell and Phillips, an attempt is made to illustrate the benefits of thrips control in Arkansas, USA, an area were earliness is important. In their experiment, cotton treated with aldicarb (0.75 lbs. a.i. in-furrow) was compared with an untreated plot. The plots were compared for plant physiological parameters as well as for yield and fiber quality. To obtain data on maturity related to fruiting position, the plots were harvested in six intervals from bottom to top.

Regarding the physiological parameters, it was observed that 60 days after planting the thrips-damaged plants in the untreated plot were 1 to 2

inches shorter than the treated plants, and after 75 days, 4 to 5 inches shorter. However, growth in the untreated plot accelerated in the subsequent period and, after 90 days, no height difference was observed. Another physiological parameter measured was the number of nodes separating the upper most-white-bloom on a first position (that is closest to the main stem) to the growth terminal. This is a measure of the growth rate later in the season when the plant gradually reduces new node production to the benefit of maturing the existing boll load. It was established that, both after 77 and 88 days, the growth rate in the treated plants was already reduced, while in the untreated plots plant-growth continued at a normal rate (7 nodes between UMB and terminal).

The yield difference per acre between the treated and untreated plots was 158 lbs. on totals of 1133 lbs. (untreated) and 1291 lbs. (treated). On the treated plots, as much as 79 percent of the harvest was obtained during the first three harvests (intervals of one week). This corresponds to only 32 percent in the untreated plots. The point of 80 percent open-bolls was reached two weeks later in the untreated plots. In terms of fiber quality, the untreated plots produced a crop of lower micronaire and lower maturity. Also the nep count was higher in the untreated cotton. Subsequent dye

tests of fabrics manufactured from the two sets of cotton confirmed the unsatisfactory maturity levels of the cotton derived from untreated plots.

An economic analysis was conducted on these data using the premiums and discounts for grade, staple and micronaire as defined in regard to the US farm loan program. Using this set of prices, it was calculated that the price difference between the cotton derived from the thrips-treated plots and the untreated plots was about 2 US cents/lb. This difference amounted for about 20 percent of the total difference in gross revenues between the two types of treatments. About 80 percent of this difference was accounted for by the yield difference.

In another experiment, also in Arkansas, USA, various thrips-control methods were evaluated. in-furrow applications of aldicarb were compared to seed treatments with acephate and foliar sprays (not specified), under both dryland and irrigated conditions. Results showed that over three years the in-furrow treatment yielded 21 percent and 16 percent more than the untreated plot under irrigation and dryland conditions respectively. The seed treatments allowed for 11 percent and 10 percent better yields, while the foliar spray increased yields by 11 percent and 8 percent respectively.

From these and other experiments, it can be learned that there are situations in which early control of thrips seems beneficial. However, these studies do not take into account the "hidden" costs of secondary pest outbreaks and resistance development. It will be very difficult to factor in these costs, but that should not mean they should be ignored. A careful weighing of the evidence in every new situation is called for. In this effort, the entomologist will be in the best position to draw attention to the "hidden costs" and to design control strategies to minimize them.

Sources:

Mauney. J.R., "Cotton Square Shedding, Why They Fall; What It Means to Yields," *Crops and Soils Magazine,* October 1984.

Carter, F.L., Tugwell, N.P., Phillips, J.R., Cochran, M.J., "Thrips Control Strategy: Effect on Crop Growth, Yield, Maturity and Quality." *Proceedings Beltwide Cotton Prod. Res. 1*989.

Cochran, M.J., Tugwell, N.P., Danforth, D.M., Carter, F., Stringer, S.J., Phillips, J.R., "Thrips Control Strategies and Crop Termination Timing Strategies." *Proceedings Beltwide Cotton Prod. Res. 1989.*

Johnson, D.R., Kimbrough, J.J., McConnell, J.S., "The Effect of Thrips Control on Cotton as Influenced by Insecticides, Irrigation and Variety." *Proceedings Beltwide Cotton Prod. Res.* 1988.

Cotton Sowing Under Plastic: Some Observations from Spain

The use of plastic in cotton cultivation in Spain started around 1981. Before 1981 plastic strips were already used for other, mostly highly valued vegetable and fruit crops such as melon. Several farmers decided to give the technology a try in cotton, apparently with success, because after 1981 the area on which plastic is used has expanded every year. Today, on almost 100 percent of the irrigated land in Las Marismas, the fertile delta of the river Guadalquivir, cotton germinates under plastic, while the technology is dominant as well in the remaining regions.

In ten years' use numerous modifications have been made to the technology in order to improve its effectiveness and to reduce costs. These alterations, induced by either farmers themselves or in response to research findings, concern the type of plastic, its measurements, the method of placement, and the time-period it remains in the field. Presently most farmers use a transparent plastic of 65 cm. width and 50 gauge thickness. The plastic is placed at sowing and a preplanting herbicide application. All the

necessary equipment is mounted at the rear-end of a sowing machine. At the front of this machine two blades placed in arrow formation form a seed-bed approximately 10 to 15 cm. below the soil surface. The seeds are dropped by conventional sowing units and a spraying installation, also mounted on the same piece of farm machinery, allows for the recommended herbicide application. Then the plastic, held in rolls placed next to the sowing units, is rolled over the seedbeds. A mechanical perforator punches little holes in the plastic strip at 10 cm. intervals to allow for the necessary aeration. Two blades placed on both sides of the seedbed at the rear-end of the machine shuffle some soil over the edges of the plastic, thereby attaching it to the soil.

The design of the machine excels in its simplicity and is easy to manufacture. The sowing machine presently in use is of local fabrication, takes four rows at a time, and costs the equivalent of about US$4000. Most farmers will employ two laborers, who walk behind the machine to correct small inaccuracies in the placement of the plastic.

The advantage of the system is that sowing can take place some twenty days earlier due to the protection the plastic provides to the low night (and

sometimes day) temperatures. In Spain this is of essential importance as most of the cotton is grown at latitudes around 37° with a corresponding short growing season. It allows the farmers to grow varieties which are less early and have higher yields. Additional benefits are obtained because the method prevents crust-forming on the clay soils after heavy spring rains. Germination is more uniform, and savings can be made in the quantity of seeds used per hectare.

The plastic is left on the field for approximately six weeks. The cotton germinates and starts growing under plastic until it has four to five leaves and the plastic hinders further elevation. During the six weeks additional aeration holes have to be made, in correspondence with the developing leaf-surface. Much research has been devoted to this subject, as insufficient respiration could jeopardize all the benefits of this technology. Multiple experiments varying size, placements and timing of the holes have resulted in the design of a simple wheel with outreaching spokes which is run over the plastic strips at the proper times.

The main disadvantage of the technology is its added costs. By using a thinner plastic, the total quantity put on the field, and thereby cost, has

been reduced significantly. Costs of the plastic are presently close to US$80 per hectare. In addition, there are extra costs for the expanded sowing machine and some farm labor used for placement and removal of the strips. On the benefit side data are still scarce but the rate of adoption of the technology is the best indication of its profitability. One series of experiments indicate that the plots under plastic yielded 74 percent more seed cotton at first harvest compared to an early maturing variety. Total harvest was about 22 percent higher. Obviously there were important variations according to year and location. Other benefits accrue from savings in the quantity of seeds used.

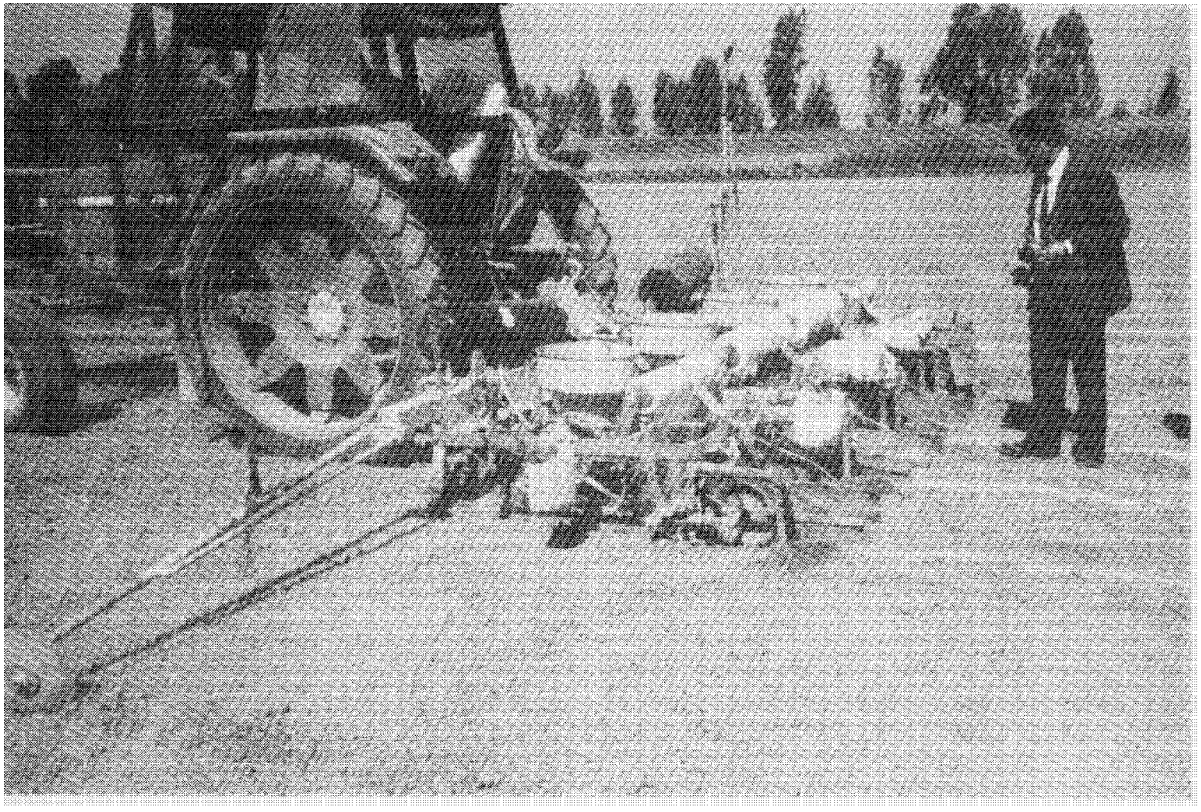
Plant protection professionals have pointed to the potential consequences of changing the micro-environment in the plant canopy during plastic coverage. The higher temperatures might induce outbreaks of early pests such as thrips and aphids. Control would be very difficult under these circumstances. The same holds true in respect to weeds and weed control. In addition, some pesticides will have a different efficiency insofar as they are temperature sensitive. This should be tested before any new pesticide is recommended.

The extension service recommends using a system of ridging. The ridges will further increase soil temperature and will improve drainage while preventing loss of seeds after heavy rains. The ridges have to be made about two months before planting by a rotary plough. During the two months the ridges will level off somewhat, which allows for the plastic strips to be placed conveniently. In the presence of ridges, farmers are advised to use plastic strips of 75 cm. width.

Research, conducted at the center of agricultural research in Córdoba, aims at further improvement of the technology. Experiments are being conducted to evaluate the use of photo and biodegradable plastics, and to find more optimum plant spacings under these conditions.

Source:

Siembra de Algodón Bajo Plástico, Francisco Marquez Portero, CIDA, Córdoba, Colección Divulgación HD 11/90.



Adapted four-row sowing machine suited for placement of plastic strips (Las Marismas, Spain, 1990).

More About Cotton Drying in the Gin

In a reaction to the editor on an article titled "Cotton Drying in the Gin: New Technologies," appearing in the December 1989 issue of *The ICAC Recorder,* Donald Van Doorn, Senior Vice President Engineering at Lummus industries, takes issue with remarks on the effectiveness of two new drying systems discussed, the Blowbox System and the Fountain Dryer. To support this viewpoint Van Doorn points at independent research conducted by engineers from USDA-ARS in New Mexico and Cotton Incorporated. This study compared the two innovative drying systems with a conventional tower system, all placed in commercial installations. For the three systems, operating parameters (air rate, air power, specific power use) and performance parameters (contact air temperatures, lint moisture loss, drier effectiveness) were assessed. The researchers came to four main conclusions:

“For the innovative systems tested, the tower drier appears to have the best potential for low temperature drying; the blow box system tested required excessive temperature to dry modestly wet seed cotton and there-

fore may be incapable of drying very wet seed cotton; the fountain system required less air power than the other systems, but a two tower system would have been comparable; the blow box system used about 1.5 times as much air power as the other two systems."

In a presentation at the 1989 Beltwide Conferences Mr. Van Doorn comments that an efficient cotton drying system among others should "assure that there is enough heat transferred to the fibers and the seed to keep the metal and air of the subsequent machinery following the drying systems warm enough to avoid the formation of a dew point." It is especially in this respect that the tower system performs well as the efficiency of heat transfer is high. According to Mr. Van Doorn, the same heat transferred using the new systems can only be obtained using higher temperatures, causing increased fiber damage and higher fuel costs.

It is clear that the last word about this issue has not been spoken. Obviously growers would not eliminate the tower dryers if they were not dissatisfied with their performance either in terms of its flexibility or horsepower requirements. It is also clear that both the conventional system as well as the new systems could still be improved leading to better performance.

Also, one should consider that every gin operates in its own typical conditions in terms of degree of variability in initial moisture contents, costs of fuel, management flexibility, and other relevant parameters. Eventually, the marketplace will provide for the final evaluation.

Short Notes

- After classing more than 95 percent of the **1989/90 US crop**, a clear idea of its **quality** of the crop has emerged. The average staple length of the upland crop was 34.7 thirty seconds of an inch (27.54 mm). More than 60 percent of it was classed staple-length 35 and 36. About 7 percent of the crop had a staplelength longer than 36. The year before the average staplelength was 34.5. In total 76.6 percent of the crop fell in the white grades (82.2 % last year) and 15.8 percent in the light spotted category (16.2% last year). Grades 31 and 41 (middling and strict low middling) in the while grades represented 32.2 and 31.4 percent of the crop, respectively. The percentage of strict middling (21) was 3.8 against 7.6 percent last year. Fiber strength as measured by HVI machines calibrated to the Pressley 1/8" gauge level takes the form of a normal distribution with an average of 26.8 grams/tex. Only 11 percent of the crop was classed less than 24 grams/tex., while 11 percent turned out to be stronger than 30 grams/tex. California cottons had the highest ratings in this respect averaging 29.9 grams/tex. Cottons from the Texas/Oklahoma region had the lowest strength with 24.8 and 24.2 grams/tex. respectively.

- In the 1989/90 season Deltapine has been the leading seed company in the USA with a share of **the cotton seed market** of 32.5 percent, according to a survey by the Agricultural Marketing Service of USDA. This result confirms the trend of a rising market share of the Mississippi-based seed company. In 1985 its market share was 20 percent while in 1988 it had grown to 30 percent. The two leading varieties in 1989/90 were Deltapine 50 (14.7% market share nationwide) and Deltapine Acala 90 (9.1% nation-wide). Paymaster and Stoneville seeds accounted for 12 and 10.1 percent, respectively, of the total acreage planted. Paymaster 145 was the leading variety in Texas with a market share of 14.2 percent in this important cotton state. In the same state more than 30 varieties were listed as having more than 0.5 percent market share. In other states this figure is situated typically between 10 and 15. In the extra-long staple cottons, the Pima S-6 was the dominating variety with 98 percent market share.

- **Two new insecticides** have recently been introduced in the market to control *Heliothis.* Both manufacturers claim that the products will be especially useful in situations were pyrethroid resistance is a problem or can become a problem. The first product is the pyrethroid Baythroid 2,

marketed by the Mobay Corporation, a subsidiary of Bayer USA, Inc. According to the product information, it is the only pyrethroid which is labeled as a *Heliothis* ovicide as well as larvicide. To use it effectively as an ovicide, it is recommended to spray it on an egg threshold. This would be easier for *Heliothis* species like *H. zea* for which the period of egg lay is very concentrated. However, when applied at the right moment the product is said to control from 65 to 85 percent of the eggs. Ovicidal action happens upon contact, so effective spraying is important. The second product is a chitin-inhibitor named Helix, developed and marketed by ICI. The product will be introduced in Australia this year. The active ingredient, chlorfuazon stops chitin production in *Heliothis* larvae. The skin of the larvae will not harden causing the grubs to die. The product is claimed to have residual activity for up to twenty days. Good spray coverage is essential as the action is related to ingestion of the substance. The product is anticipated to be most effective late in the season when most bolls have been set.

- **Special Instruments Laboratory, Inc.** (Spinlab), manufacturer of fiber testing instruments (Fibergraph) and one of the two HVI manufacturers has been **bought by Zellweger Uster, AG** of Switzerland for an undis-

closed amount. The acquisition brings together two companies which have earned their stripes in yarn testing equipment (Zellweger/Uster) and fiber testing equipment (Spinlab). Previously, Zellweger bought Schaffner Technologies Inc., the manufacturer of the Innovative Advanced Fiber Information Systems Instruments, also based in Knoxville, Tennessee. The acquisition might give a new impetus to an eventual integration of the AFIS system in an HVI-type of machine capable of cotton sample testing for commercial purposes. Company officials have stressed that all operations at Spinlab will continue unchanged with the same management team, employees, products, worldwide offices and sales representatives in place.

- After reporting in the December issue of *The ICAC Recorder* about the legal struggle of the definition of Sea Island Cotton, it has become clear that any producer of this product should meet three requirements: 1) the variety should be from the *Gossypium barbadense* genre; 2) fiber length should exceed 1 3/4"; 3) the variety should be grown in a Sea Island area, more specifically related to the Caribbean Sea. As a result of the lawsuit initiated by the Caribbean Sea Island Cotton Co. based in Barbados, a New York textile manufacturer had to terminate its marketing promotion

using a Sea Island logo for high quality cotton apparel made from Egyptian cottons. In the meantime, efforts are underway to start producing Sea Island Cotton in Belize. For this purpose, Belize Sea Island Cotton, Ltd. was created, which cooperates with Scothalls Limited of Montreal, Canada, to produce the crop on a 2,000 acre farm. A number of Texan consultants are assisting the firm to raise the high quality crop. This season a production of more than 1,000 bales is expected. (Source: *Cotton Gin and Oil Mill Press,* April 21, 1990).

- The Fifth Australian Cotton Conference will take place from August 7 to August 9, 1990 at the Conrad International Hotel and Conference Centre near Brisbane, Queensland. The conference will be a forum for presentation and discussion of the most advanced technology in cotton production and marketing. Also considerable attention will be devoted to environmental issues. The organizing committee has conveyed to the ICAC Secretariat that it warmly welcomes researchers and professionals from other countries involved in cotton to participate in this meeting with expected attendance of over 600 people. Registration fee is AUS$145, hotel costs are AUS$140 for single and double occupancy. For additional

information, please contact David Swallow, Secretary, ACGRA Inc., P.O.Box 117, Wee Waa, NSW 2388, Australia.

- As of May 24 world cotton production for the current 1989/90 season is estimated at 80 million bales, whereas consumption over this period will be 86 million bales. As a consequence stocks will be decreased by as much as 6 million bales to a level of 27 million bales. The resulting low stock-to-use ratio is a major factor in higher prices this season. After the expected substantial imports of China early this year and continued strong mill consumption in the USA, the Cotlook A-Index has recovered from a four-month moderate depression to levels well over 80 US cents per pound. Presently the Cotlook A-Index is above 90 US cents a pound. These relatively high prices have led producers in various countries to increase their plantings for the coming 1990/1991 season. Acreage in the USA is estimated at 11.8 million, up from 9.5 million acres and resulting in a possible additional 4 million bales. Preliminary estimates from China also indicate a possible additional 3 million bales. On a worldscale production the 1990/91 season is estimated at 88 million bales. However, world consumption is also expected to continue its steady increase and might be as much as a record 87 million bales. With stocks already tight,

the Cotlook A-Index average price for the next season is expected to be 85 cents a pound. (Source: *COTTON- Review of the World Situation,* May-June 1990.)

Boll Weevil Research

The Dialog search concerns a listing of the latest literature on boll weevil research. Both the Agricola and Agris databases were used. The key words used are **boll weevil** and **cotton**. The selected articles were published in either 1988 or 1989.

SAMPLE RECORD

The positions of the key fields are shown in the following sample record.

AN HL	88037272 88003307 Holding Library: AGL
TI	Interspecific gene flow in Cucurbita: C. texana vs. C. pepo
AU	Kirkpatrick, K.J.; Wilson, H.D.
JN PY	American journal of botany. Apr 1988. v. 75 (4) p. 519-527. maps. Columbus, Ohio : Botanical Society of America.
SN CO	ISSN: 0002-9122 CODEN: AJBOAA
CA	DNAL CALL NO: 450 AM36
LA	Language: English

	Includes references.
SF	Subfile: OTHER US(NOT EXP STN, EXT, USDA; SINCE 12/76);
DT	Document Type: Article
DE	DESCRIPTORS: cucurbita texana; cucurbita pepo; gene flow; biogeography; pollination; xenoglossa; pollinators;
ID	Identifiers: xenoglossa strenua
GL	Geographic Location: Texas
SH	Section Headings: PLANT BREEDING(F200); PLANT TAXONOMY AND GEOGRAPHY(F700); ENTOMOLOGY RELATED(LOO1)

Key to Data Fields

AN	DIALOG Accession Number
ID	Identifier
AN	AGRICOLA Accession Number
JN	Journal Name
AU	Author

LA	Language
CA	Call Number
PY	Publication Year
CO	CODEN
SF	Subfile
DE	Descriptor
SH	Section Heading/Code
DT	Document Type
SN	ISSN
GL	Geographic Location
TI	Title
HL	Holding Library

Data present in record depend on output format requested and type of record.

DIALOG File 10: AGRICOLA - 1979-90/FEB See File 110(thru 1978)

89064721 89065099 Holding Library: AGL
Insect-resistant cottons
Jones, J.E.; Dickson, J.I.; Graves. J.B..; Pavloff, A.M.; Leonard, B.R.;
Burris, E.; Caldwell, W.D.: Micinski, S.; Moore, S.H.; Aguillard. W.
Report of projects - Louisiana Agricultural Experiment Station, Department of Agron - omy. 1988. P. 3-11.
Baton Rouge, La. : The Department.
ISSN: 0456-5959 DNAL CALL NO: 100 L936
Language: English
Subfile: EXP STN .(STATE EXPER. STN);
Document Type: Article
DESCRIPTORS: gossypium; cultivars; pest resistance; anthonomus grandis; heliothis; cotton; fiber quality; yield components; Identifiers: cotton fiber properties
Geographic Location: Louisiana
Section Headings: PLANT BREEDING(F200); PESTS OF PLANTS-INSECTS(F821); AGRICULTURAL PRODUCTS-PLANT (NONFOOD AND NONFEED)(S200)

89060788 89065350 Holding Library: AGL
Evaluation of furrow diking and early-season insecticide applications on boll weevils (Coleoptera: Curculionidae), bollworms (Lepidoptera: Noctuidae), and cotton yield in the Texas Rolling Plains
Slosser, J.E.; Price, J.R.; Puterka, G.J.

Texas A & M University Agricultural Research, Vernon, TX
Journal of economic entomology. Apr 1989. v. 82 (2) p. 599-607.
Lanham, Md. : Entomological Society of America.
ISSN: 0022-0493 CODEN: JEENAI DNAL CALL NO: 421 J822
Language: English
Includes references.
Subfile: OTHER US .(NOT EXP STN, EXT, USDA; SINCE 12/76):
Document Type: Article
DESCRIPTORS: gossypium hirsutum; crop damage; crop yield; anthonomus grandis; heliothis zea; cultural control; insecticide application; tillage; water management; yie ld in-creases; analysis of variance;
Geographic Location: Texas
Section Headings: PESTS OF PLANTS-INSECTS(FB21); PLANT PRODUCTION-FIELD CROPS(F120); SOIL CULTIVATION(J700)

89060592 89065150 Holding Library: AGL
Effectiveness of sterile boll weevils (Coleoptera: Curculionidae) against a low-density poptulation in commercially grown cotton in northcentral Mississippi
Villavaso, E.J.; Roberson, J.L.; Seward, R.W.
USDA, ARS. Boll Weevil Research Unit, Mississippi State, MS
Journal of economic entomology. Apr 1989. v. 82 (2) p. 472-476.
Lanham, Md. : Entomological Society of America.
ISSN: 0022-0493 CODEN: JEENAI DNAL CALL NO: 421 J822

Language: English
Includes references.
Subfile: OTHER US .(NOT EXP STN. EXT, USDA; SINCE 12/76);
Document Type: Article
DESCRIPTORS: gossypium; anthonomus grandis; diflubenzuron; gamma radiation; in - sect control; sterile insect release; sterilization;
Geographic Location: Mississippi
Section Headings: PESTS OF PLANTS-INSECTS(F821)

89060587 89065145 Holding Library: AGL
Feeding response of the boll weevil (Coleoptera: Curculionidae) to ester extracts of host plants
Parrott. W.L.; McKibben, G.H.; Robbins, J.T.; Villavaso, E.J.
USDA, ARS, Mississippi State. MS
Journal of economic entomology. Apr 1989. v. 82 (2) P. 449-453. maps.
Lanham. Md. : Entomological Society of America.
ISSN: 0022-0493 CODEN: JEENAI
DNAL CALL NO: 421 J822
Language: English
Includes references.
Subfile: OTHER US .(NOT EXP STN. EXT, USDA; SINCE 12/76);
Document Type: Article

DESCRIPTORS: gossypium; anthonomus grandis; feeding behavior; insect control; plant extracts; esters; insecticidal action; hosts of plant pests; wild plants; regression analysis;
Geographic Location: south central states of USA; south eastern states of USA
Section Headings: PESTS OF PLANTS-INSECTS(F821): MATHEMATICS AND STATISTICS(X100)

89053879 89060368 Holding Library: AGL
Boll weevil (Coleoptera: Curculionidae): emergence profile of overwintered weevils measured by grandlure-baited traps and predicting total emergence
Leggett, J.E.; Dickerson, W.A.; Burnham, K.P.; Roach, S.H.; Hopkins, A.R.; Planer, F.R.
Western Cotton Research Laboratory, USDA, ARS, Phoenix, AZ Environmental entomology. Oct 1988. v. 17 (5) p. 903-910. maps.
Lanham, Md. : Entomological Society of America.
ISSN: 0046-225X CODEN: EVETEX
DNAL CALL NO: QL461.E532
Language: English
Includes references.
Subfile: OTHER US .(NOT EXP STN. EXT, USDA; SINCE 12/76);
Document Type: Article
DESCRIPTORS: gossypium hirsutum; anthonomus grandis; insect traps; population density; habitats;
Identifiers: insect emergence; insect overwintering
Geographic Location: South Carolina

Section Headings: PESTS OF PLANTS-INSECTS(F821)

89041853 89044020 Holding Library: AGL
Causes and temporal patterns of cotton fruit abscission
Stewart, S.D.; Sterling, W.L.
Auburn University, Auburn, AL
Journal of economic entomology. June 1989. v. 82 (3) p. 954-959.
Lanham, Md. : Entomological Society of America.
ISSN: 0022-0493 CODEN: JEENAI
DNAL CALL NO: 421 J822
Language: English
Includes references.
Subfile: OTHER US .(NOT EXP STN, EXT, USDA; SINCE 12/76);
Document Type: Article
DESCRIPTORS: gossypium hirsutum; fruit; crop damage; abscission; anthonomus gran - dis; heliothis; psallus seriatu; stress factors;
Geographic Location: Texas
Section Headings: PESTS OF PLANTS-INSECTS(F821); MISCELLANEOUS PLANT DISORDERS(F841)

89041825 89043992 Holding Library: AGL
Weeping lovegrass as an overwintering habitat for the boll weevil (Coleoptera: Curculi - onidae)

Brown, C.M.; Phillips. S.A. Jr
Texas Tech University, Lubbock, TX
Journal of economic entomology. June 1989. v. 82 (3) p. 799-802.
Lanham, Md. : Entomological Society of America.
ISSN: 0022-0493 CODEN: JEENAI
DNAL CALL NO: 421 J822
Language: English
Includes references.
Subfile: OTHER US .(NOT EXP STN, EXT, USDA; SINCE 12/76);
Document Type: Article
DESCRIPTORS: anthonomus grandis; habitats; overwintering: eragrostis curvula; gossypium; hosts of plant pests;
Geographic Location: Texas
Section Headings: PESTS OF PLANTS-INSECTS(F821)

89029965 89044672 Holding Library: AGL
Field observations of predation by Phidippus audax (Araneae: Salticidae) on arthropods associated with cotton
Young, O.P.;
Southern Field Crop Insect Management Laboratory, USDA, ARS, Stoneville, MS
Journal of entomological science. Apr 1989. v. 24 (2) p. 266-273.
Tifton, Ga. : Georgia Entomological Society.
ISSN: 0749-8004 CODEN: JESCEP DNAL CALL NO: QL461.G4

Language: English
Includes references.
Subfile: OTHER US .(NOT EXP STN, EXT. USDA; SINCE 12/76);
Document Type: Article
DESCRIPTORS: gossypium hirsutum; lygus lineolaris; anthonomus grandis; heliothis zea; pectinophora gossypiella; araneae; predators of insect pests;
Geographic Location: Mississippi
Section Headings: PESTS OF PLANTS-INSECTS(F821)

89001022 89020214 Holding Library: AGL
Boll weevil (Coleoptera: Curculionidae) nonpreference for primitive cotton
McCarty. J.C. Jr.; Jones, J.E.
Journal of economic entomology. Feb 1989. v. 82 (1) p. 298-300.
Lanham, Md. : Entomological Society of America.
ISSN: 0022-0493 CODEN: JEENAI DNAL CALL NO: 421 J822
Language: English
Includes references.
Subfile: OTHER US .(NOT EXP STN, EXT, USDA; SINCE 12/76);
Document Type: Article
DESCRIPTORS: gossypium hirsutum; cultivars; crop damage; anthonomus grandis; oviposition; field tests; laboratory tests;
Geographic Location: Louisiana
Section Headings: PESTS OF PLANTS-INSECTS(F821); PLANT BREEDING(F200)

89001021 89020213 Holding Library: AGL
Influence of weather on efficacy of pyrethroid insecticides for boll weevil (Coleoptera: Curculionidae) and bollworm (Lepidoptera: Noctuidae) in cotton
Guillebeau, L.P.; All, J.N.; Javid, A.M.
Journal of economic entomology. Feb 1989. V. 82 (1) p. 291-297.
Lanham, Md. : Entomological Society of America.
ISSN: 0022-0493 CODEN: JEENAI DNAL CALL NO: 421 J822
Language: English
Includes references.
Subfile: OTHER US .(NOT EXP STN, EXT, USDA; SINCE 12/76);
Document Type: Article
DESCRIPTORS: gossypium; crop damage; anthonomus grandis; heliothis; insecticidal action; pyrethroids; rain: solar radiation; temperature; weather data;
Geographic Location: Georgia
Section Headings: PESTS OF PLANTS-INSECTS(F821); METEOROLOGY AND CLI-MATOLOGY(B200)

89000977 89020169 Holding Library- AGL
Evaluation of a now method for sterilizing boll weevils (Coleoptera: Curculianidae) by dipping in a diflubenzuron suspension followed by irradiation
Haynes, J.W.; Smith, J.W.
Journal of economic entomology. Feb 1989. v. 82 (1) p. 64-68.
Lanham, Md. : Entomological Society of America.

ISSN: 0022-0493 CODEN: JEENAI DNAL CALL NO: 421 J822
Language: English
Includes references.
Subfile: OTHER US .(NOT EXP STN, EXT, USDA; SINCE 12/76);
Document Type: Article
DESCRIPTORS: anthonomus grandis; sterilization; dipping; diflubenzuron; flight; irradia - tion; longevity; sterile insect release; gossypium;
Section Headings: PESTS OF PLANTS-INSECTS(F821)

89000975 89020167 Holding Library: AGL
Toxicity of isomers of fenvalerate and fluvalinate against boll weevil (Coleoptera: Curcul i-onidae) and tobacco budwarm (Lepidoptera: Noctuidae) in the laboratory and Heliothis species (Lepidoptera: Noctuidae) in field tests
Wolfenbarger, D.A.; Harding, J.A.; Clower, D.F.; Herzog, G.A.; Bradley. J.R. Jr.
Journal of economic entomology. Feb 1989. v. 82 (1) p. 52-57.
Lanham, Md. : Entomological Society of America.
ISSN: 0022-0493 CODEN: JEENAI DNAL CALL NO: 421 J822
Language: English
Includes references.
Subfile: OTHER US .(NOT EXP STN, EXT, USDA; SINCE 12/76):
Document Type: Article
DESCRIPTORS: gossypium hirsutum; crop damage; anthonomus grandis; heliothis; py - rethroids; toxicity; field tests; laboratory tests;

Geographic Location: Georgia; Louisiana; North Carolina; Texas
Section Headings: PESTS OF PLANTS-INSECTS(F821)

88142333 89017857 Holding Library: AGL
Selection for mating propensity in irradiated populations of the cotton boll weevil
Enfield, F.D.; Sawicki, C.; North, D.T.
Theoretical and applied genetics. 1988. v. 76 (6) P. 861-864.
Berlin, W. Ger. : Springer International. ISSN: 0040-5752 CODEN: THAGA
DNAL CALL NO: 442.8 Z8
Language: English
Includes references.
Subfile: OTHER FOREIGN;
Document Type: Article
DESCRIPTORS- anthonomis grandis; animal breeding; selection; mating performance; irradiation;
Section Headings: ANIMAL GENETICS(L200); ENTOMOLOGY RELATED(L001); ANIMAL REPRODUCTION(L210)

88134088 89010794 Holding Library: AGL
Pheromone production of the boll weevil in response to seven cotton genotypes grown in two environments
Chang. J.F.; Benedict, J.H.; Payne, T.L.; Camp, B.J.
Environmental entomology. Dec 1988. v. 17 (6) p. 921-925.

Lanham, Md. : Entomological Society of America.
ISSN: 0046-225X CODEN: EVETEX
DNAL CALL NO: QL461.E532
Language: English
Includes references.
Subfile: OTHER US .(NOT EXP STN, EXT, USDA; SINCE 12/76);
Document Type: Article
DESCRIPTORS: gossypium hirsutum; genotypes; anthonomus grandis; pheromones; buds;
Section Headings: PESTS OF PLANTS-INSECTS(FB21)

88116580 89003574 Holding Library: AZUA; AGL
Distribution of boll weevil (Anthonomus grandis Boheman) eggs within cotton plants
Ramalho, F.S.; Jesus, F.M.M.
Tropical agriculture. July 1988. v. 65 (3) P. 245-248.
Guildford : Butterworth Scientific.
ISSN: 0041-3216 CODEN: TAGLA
DNAL CALL NO: 26 T754
Language: English
Includes references.
Subfile: OTHER FOREIGN;
Document Type: Article

DESCRIPTORS: gossypium hirsutum; insect pests: anthonomus grandis; distribution: behavior; oviposition; sampling; insect control;

Geographic Location: Brazil

Section Headings: ANIMAL ECOLOGY(L300); ENTOMOLOGY RELATED(LOOI); PESTS OF PLANTS-INSECTS(F821)

881O797O 88037565 Holding Library: AGL

Detecting boll weevil resistance in converted cotton race stocks by sampling single plants

Bates, S.L.; Walker, J.K.; Smith, C.W.

Proceedings Beltwide Cotton Production Research Conferences. 1988. P. 552-553.

Memphis, Tenn. : National Cotton Council and The Cotton Foundation.

CODEN: BCOPB DNAL CALL NO: SB249.N6

Language: English

Conference held on January 3-8, 1988, New Orleans. Louisiana.

Includes references.

Subfile: OTHER US .(NOT EXP STN, EXT, USDA; SINCE 12/76);

Document Type: Article

DESCRIPTORS: gossypium; genotypes; resistance; anthonomus grandis; breeding aims;

Section Headings: PESTS OF PLANTS-INSECTS(F821); PLANT BREEDING(F200)

88107893 88037488 Holding Library: AGL
Cotton insect and mite control with Capture 2.OEC insecticide/miticide
Mitchell. H.R.; Hatfield, L.D.
Proceedings Beltwide Cotton Production Research Conferences. 1988. p. 321-323.
Memphis, Tenn. National Cotton Council and The Cotton Foundation.
CODEN: BCOPB DNAL CALL NO: SB249.N6
Language: English
Conference held on January 3-8, 1988, New Orleans, Louisiana.
Includes references.
Subfile: OTHER US .(NOT EXP STN, EXT. USDA; SINCE 12/76);
Document Type: Article
DESCRIPTORS: gossypium; heliothis; species; anthonomus grandis; tetranychus; insec - ticides; efficiency; insect control;
Section Headings: PESTS OF PLANTS-INSECTS(F821)

88107876 88037471 Holding Library: AGL
Mineral oil: enhancement of field efficacy of a pyrethroid insecticide against the boll we e- vil (Coleoptera: Curculionidae)
Treach, M.F.; Benedict, J.H.; Schmidt, K.M.; Anderson, R.M.
Proceedings Beltwide Cotton Production Research Conferences. 1988. p. 288-290.
Memphis, Tenn. : National Cotton Council and The Cotton Foundation.
CODEN: BCOPB DNAL CALL NO: SB249.N6
Language: English

Conference held on January 3-8,1988, New Orleans, Louisiana.
Includes references.
Subfile: OTHER US .(NOT EXP STN. EXT, USDA; SINCE 12/76);
Document Type: Article
DESCRIPTORS: gossypium; anthonomus grandis; insect contro; efficiency; pyrethroids: mineral oils; adjuvants; diluent; Section Headings: PESTS OF PLANTS-INSECTS(F821)

88107875 88037470 Holding Library: AGL
Sterile boll weevil releases as part of a boll weevil eradication program
Smith, J.W.; Villavaso. E.J.; McGovern, W.L.; Brazzel, J.R.
Proceedings Beltwide Cotton Production Research Conferences. 1988. p. 286-287.
Memphis, Tenn. National Cotton Council and The Cotton Foundation.
CODEN: BCOPB DNAL CALL NO: SB249.N6
Language: English
Conference held on January 3-8, 1988, New Orleans, Louisiana.
Includes references.
Subfile: OTHER US .(NOT EXP STN, EXT, USDA; SINCE 12/76);
Document Type: Article
DESCRIPTORS: gossypium; anthonomus grandis; insect control programs; laboratory rearing; sterile insect release;
Geographic Location: Alabama
Section Headings: PESTS OF PLANTS-INSECTS(F821)

88107874 88037469 Holding Library: AGL
Trap crop effectiveness in community boll weevil control programs
Moore. L.; Watson, T.F.
Proceedings Beltwide Cotton Production Research Conferences. 1988. p. 285-286.
Memphis, Tenn. : National Cotton Council and The Cotton Foundation.
CODEN: BCOPB DNAL CALL NO: SB249.N6
Language: English
Conference held on January 3-8, 1988, New Orleans, Louisiana.
Subfile: OTHER US .(NOT EXP STN, EXT, USDA; SINCE 12/76);
Document Type: Article
DESCRIPTORS: gossypium; anthonomus grandis; insect control programs; traps; crops; efficiency;
Identifiers: attraction crops
Geographic Location: Arizona
Section Headings: PESTS OF PLANTS-INSECTS(F821)

88107873 88037468 Holding Library: AGL
Bacterially-induced changes in plant terpene chemistry and boll weevil pheromone
Chang, J.F.; Benedict, J.H.; Camp, B.J.; Bird, L.S.; Stipanovic, R.D.
Proceedings Beltwide Cotton Production Research Conferences. 1988. p. 282-285.
Memphis. Tenn. : National Cotton Council and The Cotton Foundation.
CODEN: BCOPB DNAL CALL NO: SB249.N6
Language: English

Conference held on January 3-8. 1988, New Orleans, Louisiana.
Includes references.
Subfile: OTHER US .(NOT EXP STN, EXT, USDA; SINCE 12/76);
Document Type: Article
DESCRIPTORS: gossypium; anthonomus grandis; sex pheromone; hosts of plant pests; host parasite relationships; monoterpenes: growth promoters; symbiosis; bacte - ria; bacillus cereus; bacillus megaterium;
Section Headings: PESTS OF PLANTS-INSECTS(F821)

88107869 88037464 Holding Library: AGL
Advances in boll weevil production technology: Alabama sterile release program, 1987
Powell, J.E.; Roberson, J.L.; King. E.G. Jr.
Proceedings - Beltwide Cotton Production Research Conferences. 1988. p. 274-276.
Memphis, Tenn. : National Cotton Council and The Cotton Foundation.
CODEN: BCOPB DNAL CALL NO: SB249.N6
Language: English
Conference held on January 3-8, 1988. New Orleans, Louisiana.
Includes references.
Subfile: OTHER US .(NOT EXP STN, EXT, USDA; SINCE 12/76);
Document Type: Article
DESCRIPTORS: gossypium; insect pests; anthonomus grandis; laboratory rearing; ster - ilization; sterile insect release; programs:
Geographic Location: Alabama

Section Headings: PESTS OF PLANTS-INSECTS(F821)

88107868 88037463 Holding Library: AGL
Cotton insect and mite control with Karate IE
Petta, J.F.;
Proceedings Beltwide Cotton Production Research Conferences. 1988. P. 272-274.
Memphis, Tenn. : National Cotton Council and The Cotton Foundation.
CODEN: BCOPB DNAL CALL NO: SB249.N6
Language: English
Conference held on January 3-8. 1988, New Orleans, Louisiana.
Includes references.
Subfile: OTHER US .(NOT EXP STN, EXT, USDA; SINCE 12/76);
Document Type: Article
DESCRIPTORS: gossypium; heliothis virescens; heliothis ze; anthonomus grandis; aphis gossypii; tetranychus; species; pyrethroids; insecticidal properties;
Section Headings: PESTS OF PLANTS-INSECTS(F821)

88107861 88037456 Holding Library: AGL
Population management of boll weevil in sustainable cotton production system
Cate, J.R.;
Proceedings Beltwide Cotton Production Research Conferences. 1988. P. 249-254.
Memphis, Tenn. : National Cotton Council and The Cotton Foundation.
CODEN: BCOPB DNAL CALL NO: SB249.N6

Language: English
Conference held on January 3-8, 1988, New Orleans, Louisiana.; Literature review.
Includes references.
Subfile: OTHER US .(NOT EXP STN. EXT, USDA; SINCE 12/76);
Document Type: Article; Surveys of Literature
DESCRIPTORS: gossypium; anthonomus grandis; insect control programs; evaluation; ecology; economics;
Geographic Location: Texas
Section Headings: PESTS OF PLANTS-INSECTS(F821)

88107860 88037455 Holding Library: AGL
Enhanced fitness of radiation sterilized cotton boll weevil through genetic engineering
North, D.T.; Enfield, F.D.; Villavasso, E.
Proceedings Beltwide Cotton Production Research Conferences. 1988. p. 247-249.
Memphis, Tenn. : National Cotton Council and The Cotton Foundation.
CODEN: BCOPB DNAL CALL NO: SB249.N6
Language: English
Conference held on January 3-8, 1988, New Orleans, Louisiana.
Includes references.
Subfile: OTHER US .(NOT EXP STN, EXT, USDA; SINCE 12/76):
Document Type: Article
DESCRIPTORS: gossypium; anthonomus grandis; strains: control methods; sterile in - sect release; radiation; sterilization; genetic engineering;

Section Headings: PESTS OF PLANTS-INSECTS(F821)

88107859 88037454 Holding Library: AGL
Regionwide management of boll weevil in southern Texas
Summy, K.R.; Hart, W.G.; Davis, M.R.; Cate, J.R.; Norman, J.W. Jr.; Wofford, C.W. Jr.; Heilman, M.D.; Namken, L.N.
Proceedings Beltwide Cotton Production Research Conferences. 1988. p. 240-247.
Memphis, Tenn. : National Cotton Council and The Cotton Foundation.
CODEN: BCOPB DNAL CALL NO: SB249.N6
Language: English
Conference held on January 3-8. 1988, New Orleans, Louisiana.
Includes references.
Subfile: OTHER US .(NOT EXP STN, EXT, USDA; SINCE 12/76);
Document Type: Article
DESCRIPTORS: gossypium; anthonomus grandis; control method; programs; crop resi - dues; overwintering; habitats; destruction;
Geographic Location: Texas
Section Headings: PESTS OF PLANTS-INSECTS(F821)

88107858 88037453 Holding Library: AGL
Southeast boll weevil eradication program
Planer, F.R.;
Proceedings Beltwide Cotton Production Research Conferences. 1988. P. 239-240.

Memphis, Tenn. : National Cotton Council and The Cotton Foundation.
CODEN: BCOPB DNAL CALL NO: SB249.N6
Language: English
Conference held on January 3-8. 1988, New Orleans, Louisiana.
Subfile: OTHER US .(NOT EXP STN. EXT, USDA; SINCE 12/76);
Document Type: Article
DESCRIPTORS: gossypium; anthonomus grandis; insect control programs;
Geographic Location: south eastern states of USA
Section Headings: PESTS OF PLANTS-INSECTS(F821)

88107847 88037442 Holding Library: AGL
Use of pheromone traps in the management of overwintered boll weevils an the Lower Gulf Coast of Texas
Benedict. J.H.; Chang, J.F.
Proceedings Beltwide Cotton Production Research Conferences. 1988. P. 205-206.
Memphis, Tenn. : National Cotton Council and The Cotton Foundation.
CODEN: BCOPB DNAL CALL NO: S8249.N6
Language: English
Conference held on January 3-8, 1988, New Orleans, Louisiana.
Includes references.
Subfile: OTHER US .(NOT EXP STN. EXT, USDA; SINCE 12/76);
Document Type: Article

DESCRIPTORS: coastal areas; gossypium; anthonomus grandis; overwintering; survey - ing; sex pheromones; insect traps; treatment; decision making;
Geographic Location: Texas
Section Headings: PESTS OF PLANTS-INSECTS(F821)

88107809 88037404 Holding Library: AGL
Boll weevil resistance in day-neutral primitive cottons
McCarty, J.C. Jr.;
Proceedings Beltwide Cotton Production Research Conferences. 1988. p. 100.
Memphis. Tenn. : National Cotton Council and The Cotton Foundation. CODEN: BCOPB
DNAL CALL NO: SB249.N6
Language: English
Conference held on January 3-8, 1988. Now Orleans, Louisiana.;
Includes abstract.
Subfile: OTHER US .(NOT EXP STN, EXT, USDA; SINCE 12/76);
Document Type: Article; Abstracts
DESCRIPTORS: gossypium hirsutum; lines; resistance; insect pests; anthonomus gran - dis; oviposition; selection methods;
Section Headings: PLANT BREEDING(F200); PESTS OF PLANTS-INSECTS(F821)

88107808 88037403 Holding Library: AGL
Boll weevil resistance in day-neutral converted primitive race stocks of Gossypium hirsu - tum L

Jones, J.E.; Novick, R.G.; Dickson, J.1.
Proceedings Beltwide Cotton Production Research Conferences. 1988. p. 99-100.
Memphis, Tenn. : National Cotton Council and The Cotton Foundation. CODEN: BCOPB
DNAL CALL NO: S8249.N6
Language: English
Conference held on January 3-8. 1988, New Orleans, Louisiana.
Includes references.
Subfile: OTHER US .(NOT EXP STN, EXT, USDA; SINCE 12/76);
Document Type: Article
DESCRIPTORS: gossypium hirsutum; strains; cultivars; resistance; insect pests; an - thonomus grandis; anthers; germplasm;
Section Headings: PLANT BREEDING(F200); PESTS OF PLANTS-INSECTS(F821)

88104469 88062236 Holding Library: AZUA; AGL
Road to boll weevil control has its potholes
Shannon, M.;
Arizona farmer-stockman. Oct 1988. v. 67 (10) P. 8-9. ill.
Tempe, Ariz. : The Journal.
ISSN: 8750-6432 DNAL CALL NO: 6 AR44
Language: English
Subfile: OTHER US .(NOT EXP STN, EXT, USDA; SINCE 12/76);
Document Type: Article

DESCRIPTORS: gossypium; cultivars; plant pests; anthonomus grandis; pest control methods; insect traps; malathion; program evaluation;

Geographic Location: Arizona

Section Headings: PLANT PRODUCTION-FIELD CROPS(F120); PESTS OF PLANTS-INSECTS(F821)

88101243 88052523 Holding Library: AGL

A look at early-season boll weevil suppression programs and synthetic pyrethroid use management of bollworm control in Arkansas

Phillips, J.; Johnson, D.; Wall, M.; Kimbrough, J.; Harris, V.

Special report - University of Arkansas, Agricultural Experiment Station. June 1988. (132) P. 53-55.

Fayetteville. Ark. : The Station. ISSN: 0571-0189

DNAL CALL NO: 100 AR42SP

Language: English

Paper presented at the Conference on ‘‘Research at Managing the Cotton Plant," Febru - ary 16, 1988, Helena, Arkansas.

Subfile: EXP STN .(STATE EXPER. STN);

Document Type: Article

DESCRIPTORS: gossypium; heliothis virescens; anthonomus grandis; pyrethroids; in - sect control;

Geographic Location: Arkansas

Section Headings: PESTS OF PLANTS-INSECTS(F821)

88083384 88036845 Holding Library: AGL
Dynamics and impact of cotton fruit abscission and survival
Stewart, S.D.; Sterling. W.L.
Environmental entomology. Aug 1988. v. 17 (4) P. 629-635.
College Park, Md. : Entomological Society of America.
ISSN: 0046-225X CODEN: EVETEX DNAL CALL NO: QL461.E532
Language: English
Includes references.
Subfile: OTHER US .(NOT
Document Type: Article
DESCRIPTORS: gossypium hirsutum; psallus seriatus; heliothis zea; heliothis vires - cens; anthonomus grandis; abscission; models;
Section Headings: PESTS OF PLANTS-INSECTS(F821); PLANT PHYSIOLOGY AND BIOCHEMISTRY(F600); MATHEMATICS AND STATISTICS(X100)

88082818 88032620 Holding Library: AGL
Volatile monpterpenes collected from the air surrounding flower buds of seven cotton genotypes
Chang, J.F.; Benedict, J.H.; Payne, T.L.; Camp, B.J.
Crop science. July/Aug 1988. v. 28 (4) p. 685-688.
Madison, Wis. .: Crop Science Society of America.
ISSN: 0011-183X CODEN: CRPSAY DNAL CALL NO: 64.8 C883
Language: English includes references.

Document Type: Article
Subfile: OTHER US .(NOT EXP STN. EXT, USDA; SINCE 12/76);
DESCRIPTORS: gossypium hirsutum; genotypes; anthonomus grandis; monoterpenes; insect pests; pest resistance; chemical composition; volatile compounds;
Geographic Location: Texas
Section Headings: PLANT PHYSIOLOGY AND BIOCHEMISTRY(F600); PLANT BREEDING(F200); PESTS OF PLANTS-INSECTS(F821)

88075699 88030910 Holding Library: AGL
Area-wide suppression of boll weevil (Coleoptera: Curculionidae) populations in Nicara - gua
Swezey, S.L.; Daxi. R.G.
Crop protection. June 1988. v. 7 (3) P. 168-176. maps.
Guildford : Butterworths.
ISSN: 0261-2194 CODEN: CRPTD6
DNAL CALL NO: SB599.CS
Language: English
Includes references.
Subfile: OTHER FOREIGN;
EXP STN, EXT, USDA; SINCE 12/76);
Document Type: Article

DESCRIPTORS: gossypium hirsutum; anthonomus grandis; population change; sup - pression; chemical control; costs; insect control; integrated pest management; trapping; insecticides:
Identifiers: methyl parathion
Geographic Location: Nicaragua
Section Headings: PESTS OF PLANTS-INSECTS(F821)

88062927 88020884 Holding Library: AGL
Karate 1E: results of cotton Heliothis spp. and boll weevil studies across the cotton belt
Fennimore, S.; Rogers, B.; Anderson, D.
Proceedings of the Beltwide Cotton Production Conference. 1988. p. 94-95.
Memphis. Tenn. : National Cotton Council.
DNAL CALL NO: SB245.B42
Language: English
Meeting held January 3-8, 1988, New Orleans, Louisiana.
Subfile: OTHER US .(NOT EXP STN, EXT, USDA; SINCE 12/76);
Document Type: Article
DESCRIPTORS: gossypium; insect pests; heliothis; species; anthonomus grandis; in - sect control; pyrethroids; damage; crop yield;
Section Headings: PESTS OF PLANTS-INSECTS(F821)

88058920 88016539 Holding Library: AZUA; AGL
Hear no weevil see no weevil, speack no weevil

Shannon, M.;
Arizona farmer-stockman. Apr 1988. v. 67 (4) p. 10-11. Ill.
Tempe. Ariz. : Arizona Farmer-Stockman. ISSN: 0004-1491
DNAL CALL NO: 6 AR44
Language: English
Subfile: OTHER US .(NOT EXP STN, EXT, USDA; SINCE 12/76);
Document Type: Article
DESCRIPTORS: gossypium; anthonomus grandis; insect control; pheromones; trap - ping; malathion; aerial spraying;
Identifiers: Arizona Cotton Growers Association
Geographic Location: Arizona
Section Headings: PESTS OF PLANTS-INSECTS(F821)

88053222 88015443 Holding Library: AGB
Laboratory and field evaluation of controlled release dispensers containing grandlure, the pheromone of the boll weevil (Coleoptera: Curculionidae)
Leonhardt, B.A.; Dickerson, W.A.; Ridgway, R.L.; Devilbiss, E.D.
Journal of economic entomology. June 1988. v. 81 (3) p. 937-943.
College Park, Md. : Entomological Society of America.
ISSN: 0022-0493 CODEN: JEENAI
DNAL CALL NO: 421 J822
Language: English
Includes references.

Subfile: OTHER US .(NOT EXP STN, EXT, USDA; SINCE 12/76);
Document Type: Article
DESCRIPTORS: gossypium; anthonomus grandis; insect attractants; insect traps; pheromones; temperature;
Geographic Location: USA
Section Headings: PESTS OF PLANTS-INSECTS(F821)

88051725 88013937 Holding Library: AGL
Comparative and residual effectiveness of new insecticides for control of boll weevil
Lentz, G.L.;
Tennessee farm and home science - Tennessee Agricultural Experiment Station. Winter 1988. (145) p. 16-18. Ill.
Knoxville, Tenn. : The Station. ISSN: 0040-3229 CODEN: TFHSA
DNAL CALL NO: 100 T25F
Language: English
Includes references.
Subfile: EXP STN .(STATE EXPER. STN);
Document Type: Article
DESCRIPTORS: gossypium; anthonomus grandis; insect control; insecticide,residues;
Geographic Location: Tennessee
Section Headings: PESTS OF PLANTS-INSECTS(F821); PESTICIDES-GEN-ERAL(H000)

88049096 88011125 Holding Library: AGL
Water content of sterile and non-sterile boll weevils as influenced by feeding increased levels of sucrose or cotton squares
Haynes, J.W.;
Journal of Entomological Science. Apr 1988. v. 23 (2) p. 155-160. Ill.
Tifton, Ga. : The Entomological Science Society.
ISSN: 0749-8004 CODEN: JESCEP
DNAL CALL NO: QL461.G4
Language: English
Includes references.
Subfile: OTHER US .(NOT EXP STN. EXT, USDA; SINCE 12/76);
Document Type: Article
DESCRIPTORS: gossypium hirsutum; anthonomus grandis; diflubenzuron; irradiation; water content;
Section Headings: PESTS OF PLANTS-INSECTS(F821)

88029395 87109389 Holding Library: AGL
Effects of ethephon an boll weevil (Coleoptera: Curculionidae) population development, cotton fruiting. and boll opening
Henneberry, T.J.; Meng, T.; Hutchison, W.D.; Bariola, L.A.; Deeter, B.
Journal of economic entomology. Apr 1988. v. 81 (2) p. 628-633.
College Park, Md. : Entomological Society of America.
ISSN: 0022-0493 CODEN: JEENAI

DNAL CALL NO: 421 J822
Language: English
Includes references.
Subfile: OTHER US .(NOT EXP STN. EXT, USDA; SINCE 12/76);
Document Type: Article
DESCRIPTORS: gossypium hirsutum; fruiting; anthonomus grandis; population dynam - ics; cultural control; ethephon; insect control;
Geographic Location: Arizona
Section Headings: PESTS OF PLANTS-INSECTS(F821); PLANT PRODUCTION-FIELD CROPS(F120)

DIALOG File: AGRIS INTERNATIONAL 74-89/NOV

1132184 AGRIS No: 89-089562
[Integrated management of cotton pests ---- the anthonomis]
Manejo integrado de pragas do algodoeiro ---- o bicudo)
Kubo. R.K.
[Pests of plants and biological control] (Pragas das culturas a controle biologico)
Cruz, B.P.B. (ed.)
Fundacao Cargill, Campinas, SP (Brazil)
Campinas, SP (Brazil), 1988, p. 88-105
Language: Portuguese

1132183 AGRIS No: 89-089561

[Control of Anthonomus grandis Boheman in Gossypium arboreum of 2 and 3 years at the state of Rio Grande do Norte, Brazil] (Controle do bicudo Anthonomus grandis Bohe - man em algodao arboreo (Moco) de 2. a 3. anos no estado do Rio Grande do Norte)

Holanda, P.E.M.; Benigno, L.A.L.; Damasceno, J.V.; Oliveira Filho, J.B. de

4. Encontro Nacional de Fitossanitaristas, Belem, PA (Brazil), 24-28 Nov 1986

[Annals of the 4th National Meeting on Plant Protection] Anais do 4. Encontro Nacional de Fitassanitaristas)

Secretaria Nacional de Defesa Agropecuaria, Brasilia, DF

(Brazil).- Secretaria de Defesa Sanitaria Vegetal

Brasilia, DF (Brazil), 1986, P. 227-231

Language: Portuguese Summary Language: Portuguese

1132176 AGRIS No: 89-089551

[Anthonomus control in Gossypium at the state of Paraiba, Brazil] (Resultadas das uni - dades demonstrativas na convivencia com a bicudo do algodoeiro no Estado da Paraiba)

Souza, H.F. de; Vilar, M.

4. Encontro Nacional de Fitossanitaristas, Belem, PA (Brazil), 24-28 Nov 1986

[Annals of the 4th National Meeting on Plant Protection]

Anais do 4. Encontro Nacional de Fitossanitaristas) Secretaria Nacional de Defesa Agropecuaria, Brasilia, DF (Brazil). Secretaria de Defesa Sanitaria Vegetal Brasilia. DF (Brazil), 1986, p. 233-235

Language: Portuguese

1121913 AGRIS No: 89-071998
Distribution of boll weevil (Anthonomis grandis Boheman) eggs within cotton plants
Ramalho. F.S.; Jesus, F.M.M. (Centro Nacional de Pesquisa do Algodao, Campina Grande, Paralba (Brazil))
Tropical Agriculture, Jul 1988, v. 65(3) P. 245-248
Language: English Summary Language: English

1097195 AGRIS No: 89-025737
The use of models for cotton crop protection
Flueckiger, C.R. (Ciba-Geigy S.A., Basel (Switzerland).
Agricultural Division Research and Development Department);
Randazzo, D.; Koukolik, M.
Working group: model in integrated crop protection. Pest and disease models in fore - casting, crop loss appraisal and decision-supported crop protection systems
Organisation internationale de Lutte Biologique, Guyancourt (France). SROP. Section Regionale Ouest Palearctique Guyancourt (France) : OILB, 1988, P. 12-18
Bulletin SROP (France), v. 11(2)
Language: English

1088863 AGRIS No: 89-015085
The Mexican cotton weevil Anthonomus grandis Boh.: challenges of cotton production in Paraguay (El picudo mejicano del algodonero, Anthonomus grandis Boh.: el desafio para la produccion algodonera en el Paraguay)

Marengo Lozada, R.M.; Alvarez, L.A.; Whitcomb, W.H.
Asuncion (Paraguay), 1987, 94 p.
Publicacion Miscelanea (Paraguay), no. 18
Language: Spanish

1081160 AGRIS No: 89-004510
Integrated management in fields with boll weevil Anthonomus grandis in Paulinia, Sao Paulo (Manejo integrado de pragas em areas cam bicudo Anthonomus grandis (Bohe - man) na regiao de Paulinia - Sao Paulo)
Cruz, V.R.; Gravena. S.; Drugowich, S.M.I.; Garcia, C.; Sao, E.H.
Ecossistema, Oct 1987, v. 12 p. 54-60
Language: Portuguese Summary Language: English, Portuguese

1081159 AGRIS No: 89-004509
Cotton anthonomus: new techniques for its control (Bicudo do algodoeira: novas tecni - cas para reduzir pulverizacoes)
Chaib, S.L.
Casa de Agricultura, Jul-Aug 1987, v. 9(4) p. 22-25
Language: Portuguese

1074498 AGRIS No: 88-102106
How to control cotton anthonomus (Vamas conhecer e controlar a bicudo do algodao)
Cruz, V.R. da

Coordenadoria de Assistencia Tecnica Integral, Campinas, SP (Brazil)
Campinas, SP (Brazil), 1987, 17 p.
Instrucao Pratica - Coordenadoria de Assistencia Tecnica Integral (Brazil), no. 233
Language: Portuguese

1074497 AGRIS No: 88-102105
Cotton; anthonomus - technical actualization (Algodao: bicudo-atualizacao tocnica)
Cruz, V.R. de
Coordenadoria de Assistencia Tecnica Integral, Campinas, SP (Brazil). Depto. de Exten - sao Rural
Campinas. SP (Brazil), 1987, 6 p.
Comunicado Tecnico - Coordenadoria de Assistencia Tecnica
Integral (Brazil), no. 71
Language: Portuguese

1074496 AGRIS NO: 88-102104
Cotton anthonomus control (Controls o bicudo do algodao)
Nascimento, J.E. do
Empresa de Assistencia Tecnica e Extensao Rural do Ceara, Fortaleza (Brazil)
Fortaleza, CE (Brazil), 1987. 18 p.
Informacoes Tecnicas - Empress de Assistencia Tecnica e Extensao Rural do Ceara (Brazil), no. 17
Language: Portuguese

1074495 AGRIS No: 88-102103
Cotton anthonomus (O perigo ronda as algodoais)
Fernandes, A.C.
Brasil Agricola. 1986, v. 1(5) p. 24-26
Language: Portuguese

1074494 AGRIS No: 88-102102
Anthonomus: this danger should be controlled (Bicudo: esse perigo deve ser controlado)
Assuncao, P.E.F. de
Correia Agricola. 1987, (no.3) p. 16-18
Language: Portuguese

1074493 AGRIS No: 88-102101
Anthonomus host plants with special reference to the Brazilian flora (Plantas hospedei - ras do bicudo com referencia especial a flora brasileira)
Lukefahr, M.J.; Barbosa, S.; Braga Sobrinho, R.
The cotton anthonomus (O bicuda do algodoeiro)
Barbosa, S.; Lukefahr, M.J.; Braga Sobrinho, R. (eds.)
Empresa Brasileira de Pesquisa Agropecuaria, Brasilia, DF
(Brazil). Depto. de Difusao de Tecnologia
Brasilia, DF (Brazil), 1986, p. 275-285
Documentos - Empress Brasileira de Pesquisa Agropecuaria.
Depto. de Difusao de Tecnologia (Brazil). no. 4

Language: Portuguese

1074492 AGRIS No: 88-102100
Plants resistant to anthonomus (Plantas resistintes ao bicudo)
Jones, J.E.; Weaver, J.B.; Shuster. M.F.
The cotton anthonomus (O bicudo do algodoeira)
Barbosa, S.; Lukefahr, M.J.; Braga Sobrinho. R. (eds.)
Empresa Brasileira de Pesquisa Agropecuaria, Brasilia, DF (Brazil). Depto. de Difusao de Tecnologia
Brasilia, DF (Brazil), 1986, p. 221-249
Documentos - Empresa Brasileira de Pesquisa Agropecuaria. Depto. de Difusao de Tec - nologia (Brazil), no. 4
Language: Portuguese Summary Language: Portuguese

1074491 AGRIS NO: 88-102099
Cultural control of anthonomus (Controle cultural do bicudo)
Walker, J.K.
The cotton anthonomus (O bicudo do algodoeiro)
Barbosa. S.; Lukefahr. M.J.; Braga Sobrinho, R. (Eds.)
Empresa Brasileira de Pesquisa Agropecuaria, Brasilia, DF (Brazil). Depto. de Difusao de Tecnologia
Brasilia, DF (Brazil), 1986, p. 159-183

Documentos - Empresa Brasileira de Pesquisa Agropecuaria. Depto. de Difusao de Tec - nologia (Brazil), no. 4
Language: Portuguese

1074490 AGRIS No: 88-102098
The use of pheromone traps for detection and Control of anthonomus (Uso de armadil - has de feromonio para levantamento. deteccao a controle do bicudo)
Leggett, J.E.
The cotton anthonomus (O bicudo do algodoeira)
Barbosa, S.; Lukefahr, M.J.; Braga Sobrinho, R. (Eds.) Empresa Brasileira de Pesquisa Agropecuaria, Brasilia, OF (Brazil). Depto. de Difusao de Tecnologia
Brasilia. DF (Brazil), 1986, p. 145-158
Documentos - Empresa Brasileira de Pesquisa Agropecuaria. Depto. de Difusao de Tec - nologia (Brazil), no. 4
Language: Portuguese Summary Language: Portuguese

1074489 AGRIS No: 88-102097
Programs to control and eradicate the anthonomus in the United States (Programas de controle de diapausa de erradicacao do bicudo nas Estados Unidos)
Martin, D.F.
The cotton anthonomus (O bicudo do algodoeiro)
Barbosa, S.; Lukefahr, M.J.: Braga Sobrinho, R. (eds.)
Empresa Brasileira de Pesquisa Agropecuaria, Brasilia, DF (Brazil). Depto. de Difusao de Tecnologia

Brasilia, DF (Brazil), 1986, P. 65-88
Documentos - Empresa Brasileira de Pesquisa Agropecuaria. Depto. de Difusao de Tec - nologia (Brazil), no. 4