Winter Survival of Pink Bollworms in Graham County

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The pink bollworm, one of the major cotton pests of the world, has been established in eastern Arizona, particularly in Graham County, for a number of years.

There has been almost no commercial damage to the cotton crop because infestations have seldom been seen before October 1. After this date, however, infestations in some fields have built up rapidly until, by November 1, up to 80 per cent of the top bolls have been infested with as many as five larvae per boll.

Research recently has been conducted in Graham County to determine, if possible, why these heavy fall infestations usually fail to produce significant damage to the cotton crop the following season, as would normally be expected in areas where this pest has become established.

Overwintering Experiment

In most infested areas the pink bollworm overwinters as an inactive, or diapausing, larva in a mature seed inside the boll, where it is protected from the elements, decay organisms, and natural enemies. In Graham County it has been observed that many larvae spend the winter in the soil, and they have been observed leaving the bolls to enter the ground even in relatively cool weather.

During the winter of 1961-62 an experiment was conducted in Graham County to determine the number of larvae remaining in protected sites within the bolls, as compared with the numbers of free larvae spending the winter in the soil, and to determine relative rates of survival, as measured by spring moth emergence.

On October 2, 1961, approximately 350 bolls from infested fields were placed in each of eight standard pink bollworm emergence cages. In the first four cages the bolls were allowed to remain on the surface of the soil throughout the winter and through the pink bollworm emergence period in the spring. In the second four cages, the bolls were placed on a quarter-inch mesh wire screen which was suspended about two inches above the soil surface. On December 23, these suspended bolls were removed and placed on the soil surface of four other emergence cages.

Effect of burial of cotton bolls on boll decay and spring emergence of pink bollworm moths, Safford, Arizona, 1961-1962.

Depth of Bolls[1] *(Inches)*	*Date of Burial*	*Boll Decay on 2/10/62*			*Boll Decay on 4/2/62*			*Spring Emergence of Pink Bollworm Moths per Cage*
		Lint	*Carpel*	*Seed*	*Lint*	*Carpel*	*Seed*	
0		Sound	Sound	Sound	Sound	Sound	Sound	14.0
2	11/16	Partial Decay	Partial Decay	Sound	Decayed	Decayed	Some Decay	5.5
4	11/16	Partial Decay	Partial Decay	Sound	Decayed	Decayed	Decayed	0.8
6	11/16	Partial Decay	Partial Decay	Sound	Decayed	Decayed	Decayed	0.0
2	2/26				Sound	Sound	Sound	7.8
4	2/26				Slight Decay	Slight Decay	Slight Decay	2.0
6	2/26				Slight Decay	Slight Decay	Slight Decay	1.0

[1]All cotton bolls were placed in cages on 11/16/61.

Cocoons With Live Larvae

On February 2, 1962, two of the four cages which had bolls suspended over the soil surface were examined for the presence of free pink bollworm larvae. Each of these cages had a piece of wood, 2″ by 2″ by 24″ partially buried in the soil. An examination of the lower surface of the wood, which was buried about an inch deep in the soil, revealed 18 and 23 clinging cocoons, respectively. All of these cocoons contained live larvae.

Adult emergence records in the spring showed that an average of 3.3 pink bollworm moths emerged from the cages in which the bolls remained on the surface of the soil throughout the winter. In the cages where the cotton bolls had been suspended over the soil until December 23 an average of 3.5 moths per cage emerged. In the cages where the suspended bolls were later placed on the soil surface only one adult moth per cage was recovered.

These data show that although a majority of the pink bollworm larvae left the bolls to overwinter as free larvae in the soil, there was a high mortality, since only a few moths emerged in the spring. This may be one of the factors in preventing pink bollworms from building up to destructive levels early in the season in Graham County. A sufficient number of larvae remained within the bolls for the entire winter, however, to justify a continuation of present boll destruction and plow-up programs.

This investigation is being continued in Graham County, where the growing season is shorter, temperatures are lower, and winter rainfall is heavier than in the lower altitudes of southern Arizona where the bulk of the cotton crop is produced. Further research is needed in the latter areas, such as Maricopa, Pinal, and Yuma counties, to observe the extent of pink bollworm survival in an environment where the growing season is longer and the winters are warmer and drier than in Graham County.

Boll Burial Experiment

It has been well established that plowing under of infested bolls in the fall reduces the number of pink bollworm moths emerging the following spring. However, little is known about the optimum date of plowing for the most effe

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Range Management Society Honors 3 Leaders

Three Arizonans honored by the Arizona Section, American Society of Range Management, at annual convention in Nogales last January, are (above, left to right) Henry G. Boice, Tucson; William M. Riggs, Dos Cabezas; and H. E. Wall, Jr., of Prescott.

Boice was honored as "a pioneer rancher whose devoted interest and outstanding leadership have promoted sound range management policies." Bill Riggs was named "Range Management Man of the Year" for his conservative grazing practices.

Wall, a range conservationist employed by the SCS, was cited for outstanding counsel and aid to ranchers in his area of northern Arizona.

More School Lunches

More school lunch programs are being pushed in the nation. Continued growth, with 65,000 schools and 14.2 million participating children, compared with 62,000 and 12.8 million in 1960, makes a record for 1962. The 2.4 billion lunches served included $181 million in federally donated foods from USDA. In 1960, 2.1 billion lunches were served and $132 million in federally donated foods were used.

Federal cash assistance amounted to almost $99 million, another record, compared to $94 million in 1960. One special program provided food to some 300 needy schools. Through combined efforts of federal, state and local people, 22,000 children had a hot lunch for the first time.

The special milk program, which encourages school children to drink more milk, was expanded to 88,000 schools and other institutions, serving 2.6 billion half pints of milk, compared with 84,000 outlets and 2.4 billion half pints in 1960. Added to the 2.4 billion half pints served with school lunches, the total represents about 5% of the nation's non-farm fluid milk consumption.

—USDA News Letter

Seater President Of Ariz. Newspaper Assn.

Meeting in Tucson in January were members of the Arizona Newspaper Association. Your editor, taking a busman's holiday, enjoyed attending their sessions.

John D. Seater, Jr., publisher of two newspapers in Gila County, is new president; Harry Montgomery of the Phoenix Gazette is new first vice-president; Samuel Player, publisher of the San Pedro Valley News at Benson, is second vice-president; and Jim Brooks, who has newspapers at Gilbert, Apache Junction and Superior, is secretary-treasurer.

R. W. Calvert of the Mesa Tribune, retiring president, becomes an ex-officio member of the board of directors. Sig Atkinson of the Chandler Arizonan also was named to that board.

"Arizona is very much like every other state we know about, in that the newspaper people are foremost in their support of the things we believe in — a strong and prosperous agriculture, a vigorous state educational system, and firm support of research in agriculture and other facets of human living," comments Dean Harold E. Myers of the U of A College of Agriculture.

"Our work in all fields of agriculture — research, education, home economics, extension, boys' and girls' club work — is successful, and successfully reported to the people whom we serve, largely through the cooperation of Arizona newspapers and farm magazines. We appreciate that support, and wish the Arizona Newspaper Association and each of its members success in 1963," said Dean Myers.

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tive reduction. This could be important in Graham County, where an appreciable number of fields are harvested early and, if advantageous, could be plowed at once, especially if this would aid in controlling pink bollworms.

An experiment was conducted during the winter of 1961-62 at Safford to shed light on this question. On November 16, 1961, approximately 350 cotton bolls, collected from pink bollworm-infested fields, were placed in each of 28 emergence cages. One series was buried at this time at the depths shown in the accompanying table. A second series was buried on February 26, 1962, two days before the legal plow-up date for cotton as established by the state Commission of Agriculture and Horticulture. Each series was replicated four times. In the spring, daily moth emergence records were taken.

The highest moth emergence was from the unburied bolls on the surface of the soil. Burial of bolls to a depth of two inches reduced spring emergence approximately 61 per cent in November buried bolls and 43 per cent in those bolls buried at the end of February. Burying bolls to a depth of four to six inches greatly reduced the spring moth emergence.

Bury 'Em Early and Deep

These observations also show that the bolls buried earlier were in more advanced stages of decay, and with a corresponding decrease in moth emergence. Boll decay is favored when the bolls are buried early and at a depth of four to six inches. This is an aid in pink bollworm suppression.

Heading for the Tall Timber

Forest roads and trails are being built in more inaccessible areas of the United States. Road and trail construction funds rose from $43 million in 1960 to almost $50 million in 1962. There are now 180,000 miles of forest roads and 106,000 miles of trails in the national forests — for better fire control, better insect and disease control and better access for hunting, fishing and other forest recreation. Visits to national forests increased from 92 million in 1960, to 102 million in 1961, and are estimated at 112 million in 1962.

—USDA News Letter