Weevil War Simmers Unresolved

Proponents and opponents of eradicating the boll weevil are separated by more than just the scientific facts

When is a weevil just a weevil that happened to drop in from some place else and when is it a sign that weevils are resident in the neighborhood? This is no child's riddle but a question which has up to $5 billion riding on its answer.

Cotton growers, supported by a large number of boll weevil experts, have long desired to rid the cotton belt of a pest which has been its bane for more than a century. Their hopes for a full-scale eradication campaign have been dealt a sharp setback, but maybe only temporarily, by a new report from the National Academy of Sciences.*

USDA/APHIS

"Biases strong as in religion"

Cotton boll weevil causes dissension

A pilot eradication program was started by the U.S. Department of Agriculture in 1978 in North Carolina and Virginia. According to some boll weevil experts, the USDA program has successfully demonstrated the feasibility of a nationwide eradication campaign. The Academy committee, on the other hand, considers that the trial was not proof of eradication and indeed was designed in such a way that it could not have provided proof, because of lack of replication and because it was located in an area where weevil populations were declining.

In formal terms, the differing conclusions turn on the most exiguous physical evidence—just 15 boll weevils that were detected in the trial eradication area. USDA scientists have concluded that the weevils were immigrants from areas outside the treated zone, and that within the zone true eradication was achieved. The Academy committee is skeptical of this claim; it believes the weevils may just as easily have been indigenous and that, even if none had been detected, that would not have been proof, under the conditions of the trial, that eradication had been achieved.

Beneath the conflict over the significance of the 15 weevils lies a more profound, almost metaphysical disagreement, one that is at the root of a highly charged political debate that has simmered without clear resolution for two decades. The issue is the very concept of eradication, which has split boll weevil biologists into two opposing camps. Some believe firmly that with the help of grandlure, the synthetic version of the weevil's mating pheromone, and other powerful new control techniques, eradication has become an attainable goal. Others consider it a chimera, pursuable only at a ruinous cost. "When you talk about eradication, that is a very controversial and emotional issue among biologists. Some think you can never eradicate and others that you can. So you get very strong biases, as strong as in religion or politics," remarks Perry L. Adkisson, of Texas A & M University.

Whether true eradication or not, the extent of suppression of the boll weevil in the test area was no mean achievement, and it is easy to understand a measure of frustration among boll weevil specialists at the Academy committee's reservations. "It is the most biased and unscientific report I have ever seen come out of the National Academy," says Ted Davich, director of the Boll Weevil Research Laboratory in Mississippi: "They say do nothing, and that's crazy. My understanding is that this report is going to mock itself into extinction."

"I am disappointed with the accuracy, quality and objectivity of the report," comments Reggie Smith, chief scientist of the leading growers' association, the National Cotton Council. But the viewpoint represented by Davich and Smith is criticized just as strongly from the other side. "There are 200 scientists in the country working on boll weevils, and to have none of them speaking out against an eradication program is shocking in my view," remarks Dean Haynes, an entomologist at Michigan State University who was a consultant to the Academy committee. Haynes considers that there is a lack of free and open scientific debate about the merits of eradication among the government scientists employed on the boll weevil program. "I don't think it boils down to an individual problem—I think it has to do with the social structure. I would call it a constrained climate of thought," says Haynes.

He considers that this climate was reflected in the three reports prepared for the USDA on the pilot eradication program, and which it was the Academy committee's task to evaluate. According to Haynes, "In the thousand pages of USDA reports, there is not a single negative comment about eradication. As for the pilot program, it was not like any science I have ever seen. It was not an objective, hypothesis-testing situation. Each boll weevil had to be rationalized away."

The chairman of the Academy committee, Gordon Guyer of Michigan State University, does not take so firm a view. "Others may feel there was a lack of objectivity in the USDA reports but I don't feel that strongly," says Guyer, who is director of the Michigan State Agricultural Cooperative Extension Service. But his committee, made up of agricultural experts and a cotton grower, although with no boll weevil specialists, did come down quite heavily in criticizing both the design of pilot eradication program and the USDA's reports concerning it.

The eradication program and a related trial were not experiments, in the committee's view, but "large-scale demonstrations, and several constraints made it impossible to plan them scientifically." The USDA team evaluating the biology of the trial performed a "job well done" but one which, through the design of the trials, "did not provide the necessary data from which to draw conclusions applicable to the entire Cotton Belt," says the Academy committee.

In a report on the economics of eradication, the USDA implies that $240 million would cover the government share of a nationwide eradication program. "Extremely small," is how the committee rates the likelihood of this estimate being correct. A 1973 estimate conducted by the Stanford Research Institute, when corrected for inflation, would set the present-day cost at between $2.24 and $4.9 billion.

**Cotton Boll Weevil: An Evaluation of USDA Programs* (National Academy Press, Washington, D.C. 1981). 130 pages.

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The next stage in the boll weevil saga is for the USDA to evaluate its own three reports, on the biology, economics, and environmental impact of eradication, together with the Academy's critique. The department's decision is unlikely to be taken in an atmosphere of pure intellectual cogitation. Cotton growers, who are spending some $300 million a year on pest control but are suffering the same amount in pest damage, believe that they are facing a crisis.

Their opinions are not without influence in the USDA and Congress. "The growers will get together and use a blackjack on this report," predicts Davich. "If this report carries any real weight, we are not going to get into an eradication program for 5 to 10 years. But if the report falls flat on its face, we have a chance."

Budget constraints may rule out any immediate prospects for an eradication program, but the pressures to mount one will not go away. For one thing, Congress in 1973 passed a law directing the Secretary of Agriculture to eradicate the boll weevil as soon as suitable methods of doing so were at hand. As opponents of eradication wryly note, it is hard to imagine any congressman urging the repeal of the law. The scientific case for rooting out the weevil may be uncertain, but the technology is tempting, and the interests of the growers may yet prevail.—NICHOLAS WADE

Engineering Education Under Stress

Undergraduate crush exacerbates shortage of faculty, resources; Iowa State avoids limits on admissions by extending time to degree

Ames, Iowa. At Iowa State University (ISU), incoming students intent on majoring in high-demand specialties in engineering and computer science are warned that it may take them 5 years rather than 4 to complete their undergraduate work. The caveat is a clear local sign of what nationally is being called the crisis in engineering education.

As in other universities around the country the oversubscribed majors are electrical engineering, computer engineering, and mechanical engineering, with chemical and aeronautical engineering not far behind. At ISU the computer science department is lodged in the College of Sciences and Humanities rather than the College of Engineering, where it is in many universities, but the same overload conditions prevail.

Nationally, the "crisis" goes beyond crowding in undergraduate programs. In high-demand areas, faculty, particularly junior faculty are in short supply. Complaints about inadequate or obsolete equipment are endemic. Morale in many places is sinking.

Perhaps most significant, the ablest graduates with bachelor's and master's degrees are accepting job offers from industry on terms that universities cannot match. The result is a depletion of the ranks of graduate students on which research and teaching heavily depend.

Cutbacks in federal support of research and manpower training going back more than a decade have contributed to the problem. But the decline in status and rewards of engineering and computer science faculty compared to their counterparts in industry is a relatively new phenomenon. And there is serious concern about the current quality of engineering education and the longer term implications of a lost generation of faculty.

How are the universities dealing with the novel combination of feast and famine in engineering? What are the effects on students and faculty? To examine the crisis in terms of such practical problems as scheduling and staffing, it is necessary to focus on a specific institution. Iowa State provides an example of a technically oriented major institution with a big engineering school that this fall put fully into effect a scheme designed to maintain the quality of the engineering program while meeting the new conditions.

At ISU the trends are clear. Enrollment in engineering has virtually doubled from a low point in the 1970's to about 5375 (4815 undergraduates) this term. At ISU, the number of engineering students has increased from less than 13 percent in 1974 to more than 20 percent of the total enrollment of some 24,200 this term. Continuing the steady climb of recent years, electrical engineering rose from 671 majors last year to 745 this term, computer engineering from 370 to 440, and mechanical engineering from 631 to 673.

A key decision for any engineering school faced with current enrollment pressures is whether to limit admission to the oversubscribed specialties. At ISU, the decision was made at the top by the State Board of Regents, who set policy for Iowa's public universities. The regents have hewed to the line of its traditional policy that all Iowa high school graduates ranking in the top half of their class are eligible for admission. The alternatives are regarded as philosophically and politically unpalatable.

Working with this version of open admissions, the faculty had to devise a way to manage an overflow. In electrical and computer engineering the crunch comes in the sophomore year after students have made it through a basic engineering program. Majors are required to take a block of three entry-level courses for the "professional" engineering program. Admission to these courses is granted according to a set of firm criteria. First preference goes to qualified students earlier denied entrance. Candidates for the courses must have completed prerequisites satisfactorily and grade point averages also figure in selection. The real bottleneck is the laboratories for entry-level "professional" courses. ISU engineering faculty have long emphasized the importance of the laboratory part of the curriculum and they chose not to dilute the lab experience. This meant continuing to have lab sections of 12 students working in two-person teams. Electrical engineering department chairman J. O. Kopplin says that the faculty feels that students "need to use the instruments to know what's going on." Crowding more students into some labs could cause safety problems, but educational considerations were paramount in the decision to hold the line. Last year laboratories ran on a full schedule that included Saturday mornings. This year, half the seats in the labs go to students denied assignments earlier, so the number bumped is going up.

In the computer science department, chairman Robert M. Stewart, Jr., says that his department is also "falling further behind." The start of classes brought 300 new declared majors. The rate of growth in the department is indicated by the fact that computer science now has 700 majors, only about 100 of

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