

Guar shows potential as drought-tolerant summer crop for Arizona grain farmers

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Arizona farmers are looking for a profitable annual crop to follow small grains that are harvested in May or June. They need one that requires little water. With modest improvements in price received or in average yield, guar may be that crop.

Guar seeds contain a gum used by several industries. The rest of the plant may be used for forage or left for soil improvement. After removal of the gum from the seeds by milling, the remaining meal is an aflatoxin-free, high protein feed.

Most of the guar gum now used in the United States is imported from India and Pakistan, where the green seed pods have also been used as food. Most U.S. guar is grown under dryland conditions in Texas, but a few Arizona farmers and scientists have been experimenting with guar for many years.

Guar tolerates salt and drought well. As a legume, it has the potential of taking care of its own nitrogen needs. Guar has a strong tap root. The productivity of crops that follow it is often dramatically increased.

U.S. research with guar began during World War II when imports from Asia were curtailed. But the work tapered off after the war. In 1975, Pinal County Extension Agent Jim Little recognized guar's new potential, and his enthusiasm has spread to several researchers and growers.

Phil Lewis, Pinal County Extension Agent working with livestock, is looking at guar as a forage crop. His tests show that with two or three irrigations, guar can produce more than two and a half tons of quality dry-matter forage per acre.

Don England, manager of the Ak-Chin Indian Reservation Farms near Maricopa, has been one of the most successful commercial growers in the state. His yields have averaged 1,500 pounds of seed per acre with about 18 inches of applied water. As a bonus, he figures his cotton produces an extra quarter bale per acre when it is planted after a guar crop.

Average commercial yields of guar seed in Arizona have been below 1,000 pounds per acre. UA Experiment Station plots, though, have produced up to 2,500 pounds per acre, indicating a good potential for increasing the commercial yields.



Checking guar that has grown with 18 inches of irrigation are (from left) Pinal County Extension Agent Jim Little, Ak-Chin farm manager Don England and Pinal County Extension Agent Phil Lewis.

Extension Agent Don Howell has conducted variety and planting-date tests at Yuma. Dr. Fred Turner, Extension soils specialist, has done similar work at Safford. UA researchers Dr. David Rubis and Dr. Duane Johnson are seeking to identify or develop a high-yielding, determinate variety of guar. They work closely with the leader of the U.S. Department of Agriculture's guar project, Dr. Roy Stafford of Vernon, Texas.

UA's Dr. Duane Johnson leads efforts to find the best ways of growing guar in Arizona with limited irrigation. Fifteen to 20 inches of applied water have produced good yields. Over-watering can stimulate excessive vegetative growth, with reduced yields of seed.

Gum from guar seeds, called gactomannan, is used to stabilize some liquids used for human foods. Its principal use, though, is as an additive to drilling muds and for oil flotation. Also, the gum is used in the purification of potash, in the waterproofing of explosives, and in paper sizing, pharmaceuticals, lotions and creams.

Guar plants have a heavy, hollow, central stalk with several branches. Blooming begins a month or so after seedlings emerge. Guar pods contain six to nine seeds each. The plants do not tiller, but they do develop branches as space permits, much as cotton does.

For planting guar, Don England picks fields where weeds are not expected to be a problem. He plants the crop about July 1 in pre-irrigated soil. When guar is planted earlier, the plants get larger and need more water, but do not yield more seed.

The seedbeds for guar should be low and flat, just high enough to allow harvesting of pods near the soil. England aims for three-to-four-inch spacing between plants in 38-inch single rows. He plans to try 30-inch rows this year.

Ag students and faculty register support for continued use of course evaluations

"I would take another course taught this way." Do you agree strongly, agree, disagree or disagree strongly?

That is one of the questions students are asked to answer anonymously at the end of each organized course at the UA College of Agriculture. On the same Course/Instructor Evaluation Questionnaire (CIEQ) are 20 other statements with which the student may agree or disagree. Examples are, "The instructor seemed to be interested in students as individuals," and "The course material was too difficult."

The form also poses open-ended requests such as, "Comment on the value of books, homework and papers in this course."

The CIEQ is one of the tools the College of Agriculture uses to maintain and improve the quality of instruction, Dr. Clinton Jacobs of the Agricultural Education Department explained recently. He and Dr. Amy Jean Knorr co-chair the college's Instructional Improvement Committee, made up of 10 faculty members and six students.

"Within the college, there has been for many years a universal acceptance of the importance of quality instruction," said Jacobs. "The real questions are how you identify and measure the quality of instruction, and how you improve it."

Recent surveys of faculty and students by this committee have found general support for the evaluation questionnaire. A majority of the 95 faculty respondents and 86 per cent of the 1,562 student respondents said they favor continued use of the CIEQ.

Dr. Lawrence M. Aleamoni, now head of the UA Office of Instructional Research and Development, designed the CIEQ in 1975 at the University of Illinois. It resulted from more than a decade of tests to find the most efficient way of collecting reliable and useful student input. Most College of Agriculture students complete the form in 6 to 15 minutes. The questionnaire is available to all of the colleges at

When guar plants are placed too closely, branching is reduced. When stands are too thin, weed problems increase and yield drops.

Irrigation management is one key to England's success with guar. In 1977 and 1978 he used a six-inch pre-irrigation and two six-inch waterings during the growing season, one in mid-August and one in September. England thinks that summer-planted, drought-tolerant guar may become a good choice for many growers in the lower desert valleys of Arizona. Arizona also has an excellent potential for producing high-quality guar planting seed.

the University of Arizona, though not all of them use it.

College of Agriculture teachers get a computer printout of evaluation results from each class. Besides the tabulation of his own students' responses, the teacher gets an indication of how those responses compare to those of students in other classes in the department, the college, the university, or at all of the universities that use this questionnaire.

The CIEQ has two other key features. First, it groups the questions into categories of instructor, interest, content, method and general attitude, and gives cumulative ratings for these categories. Most faculty members who replied to the survey said that they are able to use the quantified data on the printout to improve their teaching. Second, the form allows personal comments by students. The faculty indicated that the personal comments are even more helpful than the quantitative data. The students surveyed agreed that the comments are the most important part of the form.

The evaluations by students are one of many factors considered in decisions on promotion, tenure and merit pay raises for faculty members. More than 65 percent of the faculty surveyed and 60 to 75 percent of the students surveyed supported these uses of the CIEQ.

"The most important use of the evaluations is in giving faculty members an idea of where they can improve their courses," said Dr. Larry Crowder, who served the college as acting assistant director of resident instruction for most of 1978. For example, workshops on designing tests, which are offered through the Office of Instructional Research and Design would be beneficial if such a weakness were identified in the course evaluation.

Crowder added that the evaluations by students are just one part of a complete instructional evaluation system. "There are at least three other parts: peer evaluation, self evaluation, and an objective measurement of the quality of learning in the course."