

New, improved sorghum: 'Scientific achievement of the first magnitude'

**Purdue scientists have identified a high-protein
variety of a grain that is a staple for millions**

Throughout the world the scene was similar. Stalks of bitter green sorghum were yanked from the field, bought in the marketplace, plucked from grain elevators or other likely places. The samples of sorghum had a common destination—Purdue University and screening by plant geneticists and biochemists. . . .

After seven years of screening 9,000 samples of sorghum, Purdue scientists have found two strains, from a remote valley in Ethiopia, that have a protein quality and quantity far superior to that of other sorghums. Since the superior protein quality appears to be controlled by one gene, or possibly two, it can be bred into other strains of sorghum with relative ease.

The discovery was announced last week by J. D. Axtell, one of the Purdue investigators, at a press conference at the State Department in Washington. The Agency for International Development, part of the State Department, funded most of the Purdue research on sorghum. The actual identification of the two superior sorghum strains was made by Rameshwar Singh, an Indian graduate student at Purdue. Singh has since returned to India.

Discovering the superior sorghum strains, John A. Hannah, administrator of AID declared, "is of great significance." In fact, it is probably one of the most significant findings yet to emerge from the so-called Green Revolution—the name given the scientific effort to come up with more nutritious cereals and legumes for peoples in the developing countries (SN: 7/21/73, p. 42). Sorghum, a kind of cereal, is the dietary mainstay of 300 million of the world's poorest and hungriest people, particularly in Africa and Asia. They eke out an existence on arid, infertile lands. After they grow sorghum, they turn it into flour or mush. The upgraded sorghum also holds potential for feeding livestock more economically, especially in Latin America, where sorghum is

common livestock feed.

"It is a scientific achievement of the first magnitude," says Woods Thomas, director of international education and research at Purdue.

The superior sorghum strains contain 30 to 40 percent more protein than conventional sorghums do, and about 75 percent the protein value of milk. The superior strains also have about twice as much of the amino acid lysine as do other sorghums. As a result, the lysine is brought more into line with the other amino acids in sorghum. High-protein content and amino-acid balance in a food are crucial if people depend almost entirely on it for nutrition. People need so much protein each day to be healthy. And if the protein is to be absorbed by their bodies, it must contain a reasonable balance of the essential amino acids.

Axtell estimates it will probably be three to five years before improved sorghum strains will be available for human consumption. Whether the improved strains will be accepted by peoples in developing countries is a crucial question. An important consideration is



Oswalt, Singh and Axtell with their sorghum.

yield. Will the improved strains have a yield comparable to conventional strains? The Purdue team is now testing the strains for yield in Puerto Rico and Brazil, and it looks as if their yield is comparable. Another vital consideration is taste. The improved strains have a texture that is somewhat different from conventional sorghums. The Purdue scientists do not think the texture difference will be critical, but if it is, it can probably be altered genetically. Nor does it look as if the superior strains will be vulnerable to diseases, since they have weathered indigenous selection in Ethiopia over hundreds, even thousands, of years.

There is one problem, though, that may not be easy to overcome. Sorghums contain bitter pigments called tannins. Tannins keep birds from eating sorghum while it is growing in the field. Yet tannins limit the release of protein in the digestive tract, Purdue scientist Dallas Leon Oswald discovered. So if the superior protein sorghums are to benefit people, their tannins must be removed somewhere along the way. The Purdue scientists are working on several approaches to this problem. □

Jupiter's satellite Ganymede has an atmosphere

Up to now there was one satellite in the solar system definitely known to possess an atmosphere: Saturn's Titan. In the Oct. 5 SCIENCE evidence is presented for an atmosphere on Jupiter's largest satellite, Ganymede.

The evidence comes from the occultation by Ganymede of the star SAO 186-800 on June 7, 1972. The occultation—the passage of the satellite in front of the star—was predicted by G. E. Taylor of the Royal Greenwich Observatory.

This occultation was expected to be visible from south Asia and northern Australia. It was actually seen at the Bosscha Observatory in Indonesia and at the Kodaikanal Observatory in India.

Observers stationed at Darwin, Australia, found themselves too far south to observe the event. R. W. Carlson of the University of Southern California and eight other planetary scientists from five U.S. and three foreign institutions submitted the report.

The evidence for an atmosphere on Ganymede was the gradual extinction of the star's light as the satellite passed in front of the star. A sharp solid edge would give an abrupt cut-off; the gradual decline is interpreted as evidence that an atmosphere of gradually increasing thickness passed before the star.

The observations indicate that the surface pressure of Ganymede's atmos-