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INTERNATIONAL CENTER FOR AGRICULTURAL RESEARCH IN THE DRY AREAS
P.O. Box 5466, Aleppo, Syria
Phone: (963-21) 2213433, 2213477, 2225112, 2225012
Fax: (963-21) 2213490, 2225105

For more information contact: S.Varma@cgiar.org

New Grasspea Varieties To Relieve Suffering from Drought-Related Paralysis

ALEPPO, SYRIA and JOHANNESBURG, SOUTH AFRICA. 26 August 2002. — An international research team announced today that it has developed a series of new, nontoxic grasspea plants that will prevent a crippling disorder that affects victims of severe drought. Thousands of people who frequently confront drought and crop failures in Ethiopia, India, and Pakistan face permanent paralysis from eating grasspea—a potentially dangerous plant and food source that can survive weeks and months without rain.

While harmless to humans in small quantities, a steady diet of grasspea seeds over a three-month period can cause a neurological disorder that frequently results in irreversible paralysis of the leg muscles. According to scientists at the International Center for Agricultural Research in the Dry Areas (ICARDA), a Future Harvest Center, the incidence of the disease is likely to increase in the future as drought conditions in Africa and Asia intensify.

"Grasspea is typically the last plant standing in times of drought," says Adel El-Beltagy, ICARDA's Director General and an internationally recognized expert on dryland agriculture. "Poor people know the effects of eating grasspea but live under such desperate conditions that they have no other option but to eat it. We wanted to make this option of last resort a safe one." ICARDA is the world's leading research institution focused on improving agriculture and enhancing the environment of arid lands.

Researchers working at ICARDA headquarters in Aleppo, Syria recently harvested the first grasspea lines that can be eaten without fear of paralysis. Extensive laboratory testing has shown that ICARDA grasspea lines are completely safe for human consumption, says El-Beltagy. "I have eaten them myself, and they are quite delicious."

A legume crop—part of the family to which peas and beans belong—grasspea is commonly grown in Bangladesh, China, Ethiopia, India, Nepal, and Pakistan. It is similar in appearance to mungbean, a small green seed commonly used to produce bean sprouts in Asian cooking. Grasspea is known by many names including chickling pea and Indian vetch (North America and the United Kingdom); Almorta (Spain); Khesari or Batura (India); Gilban (Sudan and Egypt); Guaya (Ethiopia), Matri (Pakistan); Gesette (France); and Pisello bretonne (Italy).

Farmers plant grasspea as a forage crop for their animals because of its ability to survive dry conditions. Grasspea varieties are harmless to livestock. But farmers also use the crop to supplement the family diet. Grasspea, which is rich in protein and the amino acid lysine, is relatively safe for humans if eaten in small amounts. It is under desperate conditions, as in periods of drought, that people face the irreversible crippling that traditional varieties of grasspea can inflict.

At least 100,000 people in developing countries are believed to suffer from paralysis caused by the neurotoxin found in traditional grasspea plants. The disorder has

several names, including paraparesis, lathyrism, and neurolathyrism (the latter are derived from grasspea's botanical name, *Lathyrus sativus)*. Under certain conditions, eating grasspea can lead to retardation and death in young children. For reasons that are not fully understood, paralysis is more common among males than females.

Grasspea's popularity stems from its ability to grow in areas that receive as little as 200 millimeters (8 inches) of annual rainfall. Even hardy dryland crops such as lentils and barley require 200-300 millimeters (8-12 inches) of water to produce a viable crop. Grasspea is currently grown on 1.5 million hectares (3.7 million acres) worldwide. An estimated 500,000 hectares (1.25 million acres) are grown in India and Ethiopia alone.

Ali Abd El-Moneim, the ICARDA scientist who developed the new plant types, believes that the presence of neurotoxins in grasspea is closely associated with the crop's drought tolerance and its ability to survive water-logging. "The objective of our breeding program was to lower the toxins in the plant to a level safe for human consumption without losing these valuable characteristics." This was accomplished, he says, by crossing grasspea plants from the Middle East—many of which have naturally low toxin levels—with African and Asian varieties.

The toxins found in African and Asian grasspea plants are seven times more toxic than Middle Eastern types. Human consumption is considered to be safe at levels below 0.2 percent. The new ICARDA hybrids contain about a fifth of that amount, or just enough to maintain their drought and water-logging tolerance without threatening human health.

"The next step," says Abd El-Moneim, "will be to distribute the low-toxin lines to the countries most in need and encourage scientists to select locally-adapted varieties. We now have a large, stable gene pool from which national agricultural research programs can select plants suited to local conditions. Expanding the gene pool in a crop such as grasspea is no small feat. One of the reasons that people are suffering is that there is so little natural variation among the grasspeas found in nature. To lower toxin levels we had to find a way to expand the crop's genetic diversity."

To accomplish that objective, the scientists used a technique known as somaclonal variation to force the plant to mutate and to express genes that were formerly dormant. Among these dormant genes were the genetic codes that controlled the plant's neurotoxins.

Abd El-Moneim notes that ICARDA's improved lines produce 1.5 tons of seed per hectare (2.5 acres) with slightly less than 200 millimeters (8 inches) of rainfall. Conventional legumes grown in South Asia, using far higher levels of water, rarely produce more than 1 ton per hectare.

"We are far enough along to begin emphasizing seed multiplication and training," adds El-Beltagy. "We will continue fine tuning the research where that is needed, but it is important that this new technology reaches the field as quickly as possible."

To that end, ICARDA scientists are now training researchers from Ethiopia and other affected areas to develop locally adapted selections and to begin seed production programs. Steps are also being taken to alert policymakers to the problem.

Funding for ICARDA's grasspea research was provided by the United Kingdom's Department for International Development (DFID) and grants from donors to the Consultative Group on International Agricultural Research (CGIAR).

ICARDA's (www.icarda.org) mission is to improve the welfare of people and alleviate proverty through research and training in dry areas of the developing world by increasing production, productivity, and nutritional quality of food, while preserving and enhancing the natural resource base. ICARDA is a Future Harvest Center.

Future Harvest (www.futureharvest.org) is a global nonprofit organization that builds awareness and support for food and environmental research for a world with less poverty, a healthier human family, well-nourished children, and a better environment. Future Harvest is an initiative of 16 food and environmental research centers that receive funding from the Consultative Group on International Agricultural Research (CGIAR).