Agriculture

Wheat and corn are staple food for countries over the world. Corn yield has been growing for the past 50 years with the introduction of hybrid corn technology. Nonetheless, not much improvement in wheat production has been observed, until the latest strategic alliance between Nordsaat Saatzucht GmbH and Icon Genetics AG was made, making the hybrid seed system finally available for winter wheat.

Combining Nordsaat Saatzucht’s experience of seed breeding of over a century with Icon Genetics’ rubICOM technology, the two companies are able to produce wheat hybrids with excellent yield properties and improved stability under draught stress by a less costly and risky method. Hybrid seed is produced by genetic cross among different parental lines. The resulting hybrid will possess the advantages from all the breeds, like superior plant growth, seed yield and increased stress resistance. For industrial production of hybrid seeds, it is important to remove the male fertility in the female crossing partner, such that it will not be self fertilized by its own pollen.

For corn, the female partner becomes male-sterile by mechanical removal of the tassel, the anther protruding from the crown of the plant. This is easily performed since the male and female organs of corn plant are physically separated. However, the case is more complicated for wheat, as a similar manual castration is impossible due to its structure. Nordsaat Saatzucht has succeeded to inactivate the pollen and produce the desired hybrid by applying the chemical gametocide on the female line. However, the cost of the process and the risks it bears prohibit it from being widely used among farmers.

With rubICON, the new technology developed by ICON Genetics, it is now possible to maintain the female partners as male-sterile, and at the same time produce fully fertile hybrids with a more convenient method. The gene in the female crossing line responsible for male sterility is split into two fragments, causing the plant to be male-sterile. Through the subsequent hybridization steps, each hybrid progenies will only receive one fragment of the gene, making it to be fertile again and produce more of the wheat hybrid by itself.

Wolf von Rhade, Managing Director of Nordsaat Saatzucht, believed that the technology from the fellow company would help them extend their hybrid wheat business. He said, “Wheat hybrids have extraordinary cultivation properties, and their wide introduction will contribute considerably to a more efficient and environmentally friendly agriculture in Europe. In addition to yield improvement, wheat hybrids also better withstand serious weather and climate fluctuations anticipated during the coming decades”

According to Prof Yuri Gleba, CEO of Icon Genetics, this government-sponsored project is a good example of the transfer of innovative research from a plant biotechnology company to a commercial developer. He added, “For Icon Genetics as a biotech company, entering into a strategic collaboration with a reputable plant breeder is a significant step in development and commercialization of our new molecular breeding technologies.”

Hybrid Seed System for Wheat Available
Indian Researchers Develop New Variety of Finger Millet

Researchers from the Tamil Nadu Agricultural University (TNAU) have managed to develop a new strain of finger millet (Eleusine coracana), or ragi, that promises high yields and greater nutrition, as well as other useful traits. A cross derivative of Malawi 1305 and CO 13, the new variety was developed through hybridization by pure line selection.

The new variety, recently released for commercial cultivation by farmers under the name CO (Ra) 14, is of medium duration (between 105 and 110 days) and is moderately resistant to the major diseases like neck and finger blast. There is also no major incidence of pest in finger millet and the damage caused by grasshopper, ear head caterpillar, weevil and aphids were below the threshold level. The new variety has been found to excel CO 13 in yield and quality too.

In research station trials, the crop pulled in a mean grain yield of 2,184 kg/hectare, and 2,877 kg/hectare in the multi-location trials conducted across the region of Tamil Nadu. In the all-India coordinated trials, its mean yield was 2217 kg/hectares. The mean yield of straw was 8,420 kg a hectare, which was 20% higher than that the check variety CO 13, and 27.8% more than that of GPU 28. It has good yield stability across seasons and locations, recording a mean grain yield of 2,892 kg/hectare under irrigated conditions and 2,794 kg in rain fed conditions.

CO (Ra) 14 has 8-9 top-curved fingers a panicle, and 5 to 9 productive tillers. Endowed with special qualities such as easy thresh ability and synchronized maturity, CO (Ra) 14 grains are rich in protein (12.43 %), fat (3.5%), crude fiber (31%) and calcium (0.66%) with high flouring capacity (93%) and low residual weight (7%). Its grain color, appearance, flavor, texture and taste are all readily acceptable to consumers. In terms of maintenance, one or two manual weeding and plant protection measures with botanical insecticides will keep the crop healthy. And because of its synchronized maturity, the entire crop is harvested at one time according to the scientists.

There are ways whereby the nutrient levels of the CO (Ra) 14 variety can be boosted. As the nursery stage lasts for 20 to 21 days, one or two healthy seedlings should be used per hill in the beds. A nutrient dose of 30 kg a hectare each of nitrogen, phosphorus and potash should be added as basal dressing along with 12.5 tons of farmyard manure a hectare during the last plough. Micronutrient mixtures at 12.5kg a hectare should be added prior to planting, while another round of 30kg of nitrogen a hectare should be applied as top dressing when the crop is three weeks old.

Finger Millet Fact Sheet

Finger millet has outstanding properties as a subsistence food crop. Its small seeds can be stored safely for many years without insect damage, which makes it a traditional component of farmers' risk avoidance strategies in drought-prone regions of Eastern Africa and South Asia.

Further, its grain tastes very good and is an excellent dietary source of methionine — an amino acid lacking in the diets of hundreds of millions of the poor who live on starchy foods such as cassava, plantain, polished rice, and maize meal — calcium, iron, and manganese. Finally, it is productive in a wide range of environments and growing conditions, from southern Karnataka state in India to the foothills of the Himalayas in Nepal, and throughout the middle-elevation areas of Eastern and Southern Africa. However, like pearl millet, finger millet too has a nemesis - Pyricularia blight, a very close relative of rice blast.

(Source: www.icrisat.org)
New Zealand

About AgResearch

AgResearch Limited is NZ’s largest Crown Research Institute, focusing on pastoral research and development. ‘Pastoral’ refers to farm-based animals and the plants they eat. It currently has four main research campuses and ten research stations located around the country, employing over 1000 staff. The AgResearch Group comprises AgResearch Science, Celenitis Limited (a wholly owned commercial science company), and several subsidiary business units.

As an internationally renowned pastoral sciences research organization, AgResearch strives to advance science for the benefit of NZ. We are world leaders in the science of forage plants and ruminant animals. We use these research capabilities to help New Zealand’s existing and new industries to increase their global reach and transform from a commodity to a customer-focused.

Corporate URLs:

- AgResearch: www.agresearch.co.nz
- MAF: www.maf.govt.nz
- ESR: www.esr.cri.nz
- AgriQuality: www.agriquality.co.nz

New Zealand has plans to set up three national centers of science and AgResearch, NZ’s biggest Crown Research Institute and an acknowledged world leader in pastoral science, will be involved in this collaboration. The establishment of the three national centers will significantly boost the international leadership role of AgResearch and its partners and of the broader NZ scientific community, in plant and animal research and development. New Zealand’s animal products are one of the country’s top sources of export earnings, and the national centers will boost the protection, viability and development of their animal-based pastoral industries.

AgResearch first proposed plans to turn its major campuses at Hamilton, Palmerston North and Dunedin into Science Innovation Centers in May last year. The proposal aimed to optimize infrastructure while building a critical mass of science capabilities and highly developed facilities around three key campuses. The centers will be based around Palmerston North, Upper Hutt, and Dunedin. Dedicated science teams will work alongside each other, all with easier and swifter access to related expertise and state-of-the-art facilities.

The three centers of science collaboration are:

- **Institute of Animal Health**

  The new NZD14 million (US$8.84 million) purpose built research facility at Massey should be ready by 2006. New animal facilities will also be built at the AgResearch Grasslands campus to support the Institute. The emphasis of the research will be on infectious diseases endemic to NZ which threaten productivity of the pastoral sector, animal welfare, the sustainability of farming systems, food safety or market access for animal products.

- **Infectious Diseases Diagnostic Team**

  The Infectious Diseases diagnostic team will be part of a National Center for Biosecurity and Emerging Diseases proposed by the Ministry of Agriculture and Forestry (MAF) and the Institute of Environmental Science and Research Limited (ESR). That will bring together researchers on infectious diseases, disease outbreaks, investigation and diagnosis. MAF already has its own containment facility at Wallaceville, the only infectious disease laboratory facility NZ that provides PC3+ level of containment, but is looking at bringing ESR disease investigators on-site to combine exotic animal disease investigation and outbreaks into a national centre. AgriQuality, a food safety and biosecurity organization, will also be involved in this effort.

- **Institute of Reproductive Research**

  An institute of reproductive research is proposed for Dunedin, in conjunction with the University of Otago, aims to bring together New Zealand’s top reproductive scientists. Research will continue focus on fertility, specifically on understanding genetic processes in the ovaries that affect sheep and human reproduction.
Among all the Asian countries, India stands out as one of the important players in the global biotechnology industry. Availability of the talented biotechnology experts, superb R&D institutions, excellent medical institutions and pharmaceutical industry, along with their existing IT skills and government support, this country is now attracting attention on the world stage of biotechnology. The special issue coming in September will present a deep investigation into the factors contributing to India’s bloom on biotechnology and its current state.

Topics discussed include

• Public environment of biotechnology in India (expenditure, capacity building, regulatory framework, financing, public-private partnerships, IPR protection, industry associations)
• Overview of the medical, agricultural, industrial and environmental biotech sectors
• Opportunity Sectors
• Technologies in which India is emerging as a Leader
• Companies leading India’s biotech brigade
• Opportunities for foreign players and venture capitalists

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