*International Journal of Plant Sciences,* **Vol. 3 No. 2 : 668-670 (July, 2008)**

***A Review:***

# Apomictic breeding

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***(Accepted : April, 2008)***

**SUMMARY**

Shaping agriculture for both human needs and for environmental health can be greatly accelerated by properly developing the trait of apomixis. Apomixis is the natural ability of more than 400 plant species to reproduce asexually through seed (Nogler, 1984). Apomixis is a reproductive process that bypasses female meiosis, syngamy and the consequent recombination resulting in the production of seeds genetically identical to the maternal plant. Apomixis is an attractive trait for the enhancement of crop species because it mediates the formation of large genetically uniform populations and perpetuates hybrid vigor through successive seed generations that respond particularly well to a given environment or social need. This tool would enable us to adapt plants to the environment, rather than the current necessity for adapting the environment to the plants through intensive agricultural practice.

**Key words :** Reproduction, Asexual reproduction, Apomictic reproduction, Apomixis.

Farmers and particularly poor farmers in the developing world, the greatest benefits are expected to relate to the breeding of robust, high yielding varieties for specific environments. improvements in the security of food supply, and greater autonomy over variety ownership. Conversely, for farmers in the developed world, the greatest benefit expected to be the economic production of new advanced, high yielding varieties for use in mechanized agricultural systems.

Apomixis could have a major impact on seed-propagated crops, forage and fibre production around the world. It would especially be beneficial in the major annual grain crops such as wheat, rice and soybean where hybrid vigor is present but systems for commercially producing hybrids may not be available and economical. In crops such as maize, sorghum and pearl millet, commercial hybrid production systems are available but apomixis could have a major impact by simplifying hybrid seed production and by making hybrids readily available and affordable in developing countries.

Like genetic engineering, apomixis would demolish some of the species barriers that have contained the evolution of our crops. The combination of apomixis' capacity to create and stabilize new genetic combinations and to break the species barriers could lead to the "asexual revolution", which could even dwarf the Green Revolution.

Apomixis technology could play a major role in feeding the growing population of our planet (Jefferson, 1994) provided that it will be freely accessible to all users, especially resource-poor farmers in developing countries, requiring innovative approaches for technology generation, patenting, and licensing.

### *Approaches for apomictic breeding :*

Three approaches are presently being followed in apomictic breeding:

- Introgression, *viz.*, transfer of apomixis gene(s) from wild relatives through interspecific hybridization;
- mutagenesis and
- Molecular biology and genetic engineering approaches for induction or *de novo* synthesis of apomixes.

**Table 1 : Important cereal crops and their donors of apomictic genes**

| Crop | Donors of apomictic genes |
|---|---|
| Pearl Millet *(Pennisetum glaucum)* | *P. squamulatum* |
| Maize | *Tripsacum dactyloides* |
| Wheat | *Elymus rectisetus* |

### *Types of apomixes :*

Apomixis is broadly classified into two: Gametophytic apomixes and Sporophytic apomixes.

*Gametophytic apomixis:*

The embryo sac (female gametophyte) is produced either from the unreduced megaspore (diplospory) or from any other diploid somatic cell from the nucellus or the integument of the ovule (apospory).

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