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Use of intergeneric crosses in cereals and especially for increasing triticales genetic diversity

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Many species or even genera from tribe *Triticeae* may intercross, either spontaneously as for apparition of durum wheat and later bread wheat or by human action as for triticales. The result may involve the whole genomes (polyploidization as for examples previously cited), only some whole chromosomes (addition lines), part of chromosomes (e.g. 1B-1R translocation 1B-1R) or be restricted to as small as possible part of chromosome (introgression of disease resistance gene for example). These possibilities have been widely used for small grain cereals breeding for many traits as disease resistance, grain quality, frost or drought resistance or for genetic diversity increase (triticales and bread wheat by crossing durum wheat and *Aegilops* i.e. synthetic wheat).

However, such crosses are not straightforward and many difficulties have to be overcome: poor crossability and seed setting, no endosperm development requiring in vitro embryo rescue, poor germination of hybrid seeds, necrosis, meiotic instability and sterility... For triticales, a man made cereal, no natural genetic diversity could be expected, that is why wheat by rye crosses should be made in order to increase triticales genetic diversity. A few Asian wheat cultivars carry recessive crossability genes allowing the intergeneric crosses. Several of these genes have been identified and located (Kr1, Kr2, Kr3 Kr4 and more recently Skr). However Asian wheat is not well-adapted to European growing conditions. This is why we decided to introduce crossability in some French wheat varieties. The long backcross process, with selfing and test crosses by rye at each generation, was achieved for eleven French wheats in past years. But we recently succeeded the introgression of Skr in "Barok" French cultivar more quickly and rapidly by use of molecular markers allowing Marker Assisted Selection. The markers are unfortunately not close enough to the trait to be diagnostic markers. We are now able to produce easily primary triticales for taking into account more extensively rye diversity and to study these kinds of intergeneric crosses.

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