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FACTSHEET

Hybrid Crops

Crops produced from F1 hybrid seed offer growers significant benefits in terms of yield improvement, agronomic performance and consistency of end-use quality. This is due to the 'hybrid vigour' derived in a single season by combining two carefully selected parent lines. But attempting to farm-save hybrid varieties will result in segregating populations producing highly variable offspring, which can lead to reduced yield, disease resistance and quality. As this factsheet explains, it doesn't make economic or agronomic sense to save seed of an F1 hybrid. Regardless it is illegal without the breeder's permission to produce farm-saved seed from hybrids.

Introduction

Hybrid crops are derived from an established and well-proven breeding method used in the agriculture, horticulture and ornamental sectors. Since their introduction, nearly 100 years ago, hybrid crops have come to dominate commercial production in many important crop species.

In the UK, for example, sugar beet, forage maize and many vegetable crops are all grown from F1 hybrid seed. Hybrid varieties also account for an increasing share of the rapeseed and winter barley market, and new hybrid wheat varieties have recently been introduced.

The development of hybrid crops has been one of the major factors behind a dramatic increase in global crop yields. Such improvement is achieved through the selective and controlled breeding of two inbred parent lines, which upon crossing delivers heterosis, or 'hybrid vigour'. This boost in performance, combining the best yield, quality and agronomic characters from each parent, is the result of hybrid breeding.

Hybrid Seed Production

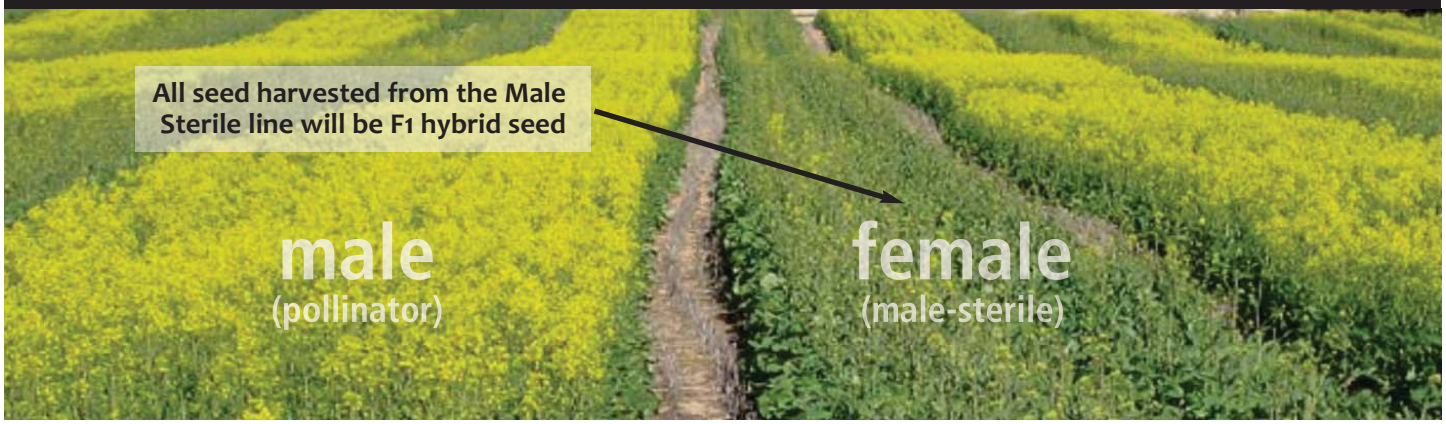
Genetically uniform inbred lines (parents) are carefully selected by the breeder in trials over several years to identify the best combination of genetics in the hybrid variety.

By creating male sterility in one parent (female line, producing no pollen), it is then fertilised by the pollen of the other parent (male line) when the two lines are grown together under carefully controlled conditions.

This restores fertility, producing viable seed with hybrid vigour. This seed is the F1 hybrid variety that is tested in official variety registration trials and for the Recommended List.

The selection and seed production process in F1 hybrids is expensive but the performance in yield and other characters compensates for the extra cost. As this process does not readily occur in nature, the production of hybrid seed must be undertaken each season.

Commercial seed production of F1 hybrid oilseed rape



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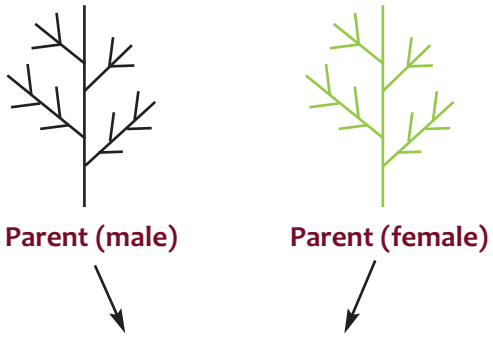
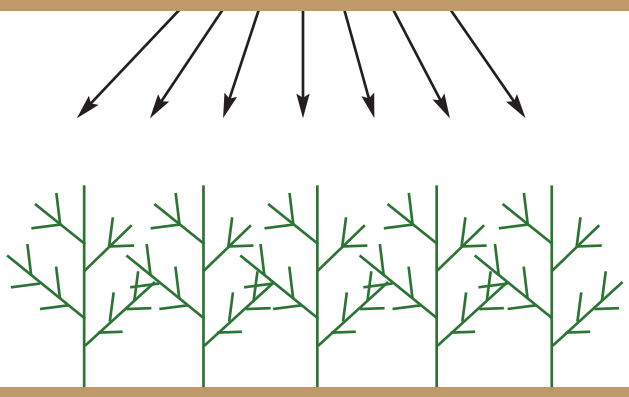
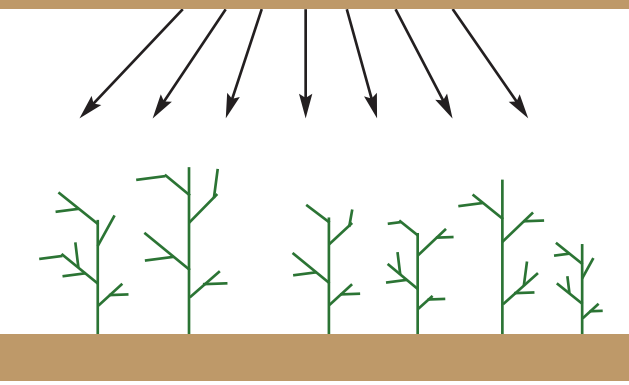
F1 hybrid seed is produced by crossing carefully selected male and female parent lines



F1 hybrid seed delivers 'hybrid vigour' in the resulting crop



If farm-saved, hybrid crops segregate and produce highly variable offspring



"The F2 generation of hybrid OSR will lose hybrid vigour and produce a segregating population, encompassing all the genetic variation of the original parents and without the dominant gene combinations that were the foundation of the original hybrid's performance. Aside from the legal implications, there is simply no economic or agronomic basis for using farm-saved seed of an F1 hybrid."

Simon Kightley, NIAB TAG

Farm-Saved Seed

If a hybrid crop is grown on again as farm-saved seed it will not produce plants or perform similar to the hybrid parent due to genetic regression and segregation. The resultant crop of a second generation hybrid will lose heterosis and its performance can be expected to be less than either of the component parents. As such the crop will not resemble the original variety either botanically or in performance and character. In effect a hybrid will not reproduce true to type in a F2 generation. So for technical and commercial reasons hybrids are not re-established as farm-saved seed.

Plant Breeders Rights

Indeed under current Plant Breeders Rights legislation (EU Council Regulation 2100/94 on Community Plant Variety Rights and the UK Plant Varieties and Seeds Act 1997), the use of farm-saved seed from a hybrid is not permitted without the breeder's consent. While this is a matter for each individual breeder, it is known that the resulting crops will segregate to produce variable offspring, reduced yields and loss of agronomic characters. For example, an oilseed rape hybrid with canker resistance inherited from one of the parent lines could lose that resistance when grown on as farm-saved seed.

New Quality Standards

Farm-saved seed from hybrid oilseed rape may also give rise to uneven quality and maturity resulting in variable glucosinolate content and problems with red or immature seeds at harvest. **From harvest 2013, European oilseed crushers will only accept rapeseed from varieties registered with a glucosinolate content of 18 µmole or lower.** Crops must be established from certified seed of hybrid varieties, or from certified or once-grown farm-saved seed of open-pollinated varieties. **Rapeseed produced from farm-saved seed of a hybrid variety will not be accepted by crushers.**

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The British Society of Plant Breeders (BSPB) is the representative body for the UK plant breeding industry. Acting on members' behalf, BSPB licenses, collects and distributes certified seed royalties and farm-saved seed payments on agricultural and horticultural crops. The Society represents members' interests on technical, regulatory and intellectual property matters, and works to promote continued innovation and investment in UK plant breeding.

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