



STEPPING UP THE PACE OF ALL-ROUND OSR IMPROVEMENT

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The pace of all-round winter OSR variety improvement is being stepped-up massively through far more sophisticated use and application of DNA information at DEKALB's much expanded and European breeding centre in Boissay to the south west of Paris.

Over the past 20 years, marked-assisted selection has been highly successful in allowing the oilseed rape breeding leader to introduce and fix major gene traits like RLM7 phoma and pod shatter resistance and characters like Clearfield and the semi-dwarf habit into the crop.

Advanced hybrid breeding has enabled these traits to be reliably combined both with one another and with steady improvements in yield and quality as well as polygenic disease resistance, vigorous establishment, environmental stress tolerance and differing rates of autumn and spring development.

"Up to now progress in improving these complex traits has been limited by the fact that they are governed by many genes – each with a relatively small effect," explained DEKALB breeder, Matthew Clarke. "This makes them far less responsive to traditional marker-assisted selection.

"Genome-wide selection is, however, allowing us overcome this limitation in a way which promises to revolutionise plant breeding in the same way it is already doing in the livestock sector. It is actually turning our approach to breeding on its head. In the past our primary focus has been on identifying which parts of the chromosome are significantly associated with a trait. This allows us to fix these traits in our parent lines so we can reliably combine them into our restored hybrids.

"But we have always known that some parental combinations have that 'magic' 1+1=3 factor that makes a really good hybrid, whereas others don't work nearly so well, even though they appear to have the same traits. So in genome-wide selection we start with our most successful hybrids. We genetically profile them, identifying whole blocks of their genomes that are distinctively associated with the high performance package they are carrying, including the hybrid vigour effect unique to them.

"Knowing what we are looking for, we then actively seek these blocks of genes in our parent lines," he said. "Indeed, with the genetic mapping and data processing capacities we have today we have models that allow us to estimate with considerable accuracy the overall breeding value of parents for the outcomes we desire."

Matthew Clarke stresses that this is a huge step forward in the speed of genetic improvement he and his colleagues are able to make in breeding hybrids with combinations of characters suited to different environments and production regimes.

He insists that marker-assisted selection will continue to remain an important route for introducing and fixing new traits involving relatively few genes into the DEKALB portfolio, pointing out that the team are adding new markers to their library the whole time.

Alongside it, though, he foresees genome-wide selection making a particularly big impact in improving the reliability and resilience of oilseed rape as a crop in the coming few years while significantly accelerating rates of yield and oil quality improvement.

"Our driving force has always been to produce robust varieties that deliver continual improvements in all-round strength for growers rather than improvements in particular areas at the expense of others," insisted Matthew.

"I am confident genome-wide selection will enable us to do this even better than we have been able to in the past. It's a very exciting time to be in OSR breeding."

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