

### **3.4 Suitability for mechanized cultivation**

Mechanized cultivation has become one of the clearest filters in modern variety evaluation. For rapeseed in rotation with rice, mechanization includes not only combine harvest but also sowing, drainage coordination, residue management, and the possibility of large-scale, service-based operations. A variety suited to mechanization typically needs reasonably consistent emergence, a canopy architecture that does not collapse easily, synchronized ripening, and a harvest window that is not excessively narrow.

The enterprise and demonstration descriptions associated with Qianjiang 661 present it as compatible with mechanized production conditions. That wording should be interpreted carefully. It does not mean that the variety solves all machine-harvest problems or that it has been publicly benchmarked against every competing cultivar across regions. It means that, in the demonstration contexts cited for this review, it has shown the kind of performance that makes mechanized production feasible and commercially relevant.

This is an important distinction because mechanization is not just a labor-saving convenience. In many parts of eastern China, it has become the condition for maintaining winter rapeseed at all. Varieties that cannot enter mechanized systems risk remaining marginal regardless of their theoretical potential. In that respect, the reported mechanization fit of Qianjiang 661 is one of its strongest practical selling points.

## **4 Application Effects of Qianjiang 661 in Rice-Rapeseed Rotation Systems**

### **4.1 Effects on rapeseed yield formation**

Yield in rice-rapeseed systems is best understood as an outcome of fit between genotype, calendar, and field conditions. In such systems, yield loss often begins before the crop's reproductive phase. Late sowing, poor drainage, uneven seedling establishment, and soil structural problems inherited from paddy management can all reduce the number of effective plants and productive branches. That is why the practical effect of a variety like Qianjiang 661 should be evaluated through the whole sequence of yield formation rather than only through final seed weight per hectare.

The evidence base used in this review suggests that Qianjiang 661 performs well in terms of population uniformity and synchronized maturity under production conditions. Those observations matter because uniform populations generally support more even canopy development and more coherent reproductive progression. In a mechanized farming environment, they also reduce the mismatch between biological maturity and harvesting time. Put plainly, a crop that grows together is more likely to finish together and be harvested efficiently.

Because public multi-location yield tables for Qianjiang 661 are not widely available in indexed literature, this paper avoids inventing a numeric yield ranking. The more defensible conclusion is qualitative: Qianjiang 661 appears to support yield formation by protecting the field-level conditions that matter most in rice-rapeseed systems—namely establishment quality, uniform stand development, and operationally manageable maturity.

### **4.2 Effects on cropping system efficiency**

Cropping system efficiency is wider than rapeseed yield alone. It includes how much land time is productively occupied, how smoothly one crop hands over to the next, and how much management friction accumulates across the year. In this sense, a rapeseed cultivar can improve a system even when its individual yield advantage is moderate, provided it reduces delays and uncertainty in the annual sequence.

For Qianjiang 661, the main efficiency effect likely lies in reducing schedule conflict. A rotation-compatible rapeseed crop helps convert the post-rice period into productive winter use without imposing a late spring penalty on the next rice crop. This is a classic example of system value rather than single-crop value. It reflects the insight from sustainable intensification research that production gains can come from redesigning the use of time, land, and ecological processes, not only from increasing input intensity (Gurr et al., 2016; Pretty, 2018).

### **4.3 Effects on farmland resource utilization**

Winter rapeseed can improve farmland resource utilization in at least three ways. First, it uses solar radiation, water, and residual soil nutrients during a season that might otherwise remain underused. Second, it maintains a