

left bare for months, which can reduce erosion risk, support nutrient capture, and improve visual and functional use of farmland in winter.

The third advantage is strategic. Rapeseed rotation in rice areas contributes directly to regional oilseed supply and indirectly to national oil security. China is a major producer of rapeseed oil, but it is also exposed to broader pressures in global edible-oil trade. Under such conditions, domestically integrated oilseed systems become more valuable than their field-scale economics alone might suggest. A hectare of winter rapeseed in a rice region is not just a secondary crop; it is part of a distributed buffer for domestic supply.

### **2.3 Demand for improved rapeseed varieties in rotation systems**

The logic of variety demand in rice-rapeseed systems is straightforward: a rapeseed cultivar must fit the calendar that rice leaves behind. That means it must establish quickly after rice harvest, tolerate the physical legacy of paddy cultivation, survive winter conditions, flower and mature in time for spring harvest, and ideally do so with a plant architecture that is not too difficult to manage mechanically. In other words, breeders are solving a systems problem, not only a single-season yield problem.

This requirement immediately changes the trait portfolio. In rotation systems, breeders and growers emphasize moderate growth duration, stable early vigor, synchronized maturity, lodging resistance, reasonable first-branch/first-pod height for machine harvest, and consistent expression under late sowing. These are classic “fit” traits. They may not produce spectacular headlines, but they often decide whether a variety is actually adopted at scale. The same broader logic appears in studies of sustainable agriculture and land-sparing versus land-sharing debates: system performance depends on how production, ecology, and management constraints are integrated, not on a single maximal trait value (Green et al., 2005; Phalan et al., 2011; Pretty, 2018).

A further point deserves emphasis. In rice-rapeseed areas, variety improvement is increasingly connected to mechanization. A cultivar that yields well in small-plot trials but matures unevenly, lodges badly, or produces excessive harvest loss under machine conditions is unlikely to satisfy commercial farms or service contractors. This is why the demand for improved varieties in rotation systems has shifted toward practical agronomic reliability. Qianjiang 661 should be evaluated in that light.

## **3 Biological and Agronomic Characteristics of Qianjiang 661**

### **3.1 Growth duration and maturity characteristics**

Publicly indexed, variety-specific descriptor sheets for Qianjiang 661 remain scarce, so caution is needed. On the basis of the case materials specified for this review, Qianjiang 661 is treated as a rapeseed cultivar designed for practical deployment in rice-rapeseed rotation environments, especially in Zhejiang and comparable eastern rice areas. Within that production logic, its most important biological feature is not absolute earliness in a vacuum, but maturity that is early enough to fit the annual calendar without losing the biomass and reproductive development needed for commercial seed yield.

This distinction matters. A cultivar can be too late for the next rice crop, but it can also be so early that it loses winter growth potential and seed-yield expression. The agronomic value of a rotation cultivar therefore lies in calibrated duration. Evidence from rapeseed adaptation studies shows that climate and growing season strongly shape where a cultivar remains suitable, and climate change itself may shift the geographical range of rapeseed production (Jaime et al., 2018). In farming terms, then, growth duration is a system trait. A suitable duration means more than “short duration”; it means a duration that fits regional operational reality.

In the materials used for this review, Qianjiang 661 is repeatedly associated with favorable schedule matching in local rice-rapeseed systems. Even without a fully documented public descriptor package, that pattern supports a cautious but useful conclusion: the cultivar’s maturity timing is one of its main arguments for adoption. For a rotation system, that alone is a substantial advantage.

### **3.2 Plant architecture and yield-related traits**

Plant architecture is where variety performance becomes visible to growers. In rapeseed, architecture shapes light interception, lodging behavior, machine harvestability, and ultimately the reliability with which yield components