WORLD COFFEE RESEARCH

THE FUTURE OF ROBUSTA QUALITY

Considerations for genetic improvement

Focus group report-out, April 2023

Executive summary

The market for robusta (coffee of the *C. canephora* species) has seen astonishing growth in the last few decades—rising from 25% to 40% in the last 30 years.[1] This growth represents a major share of all global coffee demand growth. Demand is not expected to slow down—the coffee markets with the highest growth rates and youngest populations are all markets that currently consume primarily robustas.

Robusta is here to stay. And yet, robusta production and consumption markets are still in many ways in their infancy. According to WCR's Robusta Catalog, "The scope of genetic diversity in robusta coffee is much larger than that of arabica. There are many unknown variations (including traits related to cup quality) in the robusta gene pool. By and large, these hidden variations are yet to be explored by breeders."[2]

World Coffee Research (WCR) is exploring the potential to improve robusta through breeding. To support the development of a breeding strategy, in April 2023 WCR convened a focus group discussion with buyers of robusta coffees at the Lavazza Innovation Centre in Turin, Italy, to discuss their views, needs, and preferences when it comes to robusta quality. Perhaps naturally, given the fact that quality has not historically been at the forefront for robusta, the conversation also turned to challenges and opportunities around production, supply, and demand.

Participants identified the following as key challenges for the future of robusta: supply shortages, farmer attrition, consolidation of origin diversity, consistency of quality, low consumer perception of robusta in some markets, lack of institutional support for improving production or opening new robusta production areas, regulatory pressure regarding deforestation and chemical inputs.

Participants also identified numerous opportunities: Stronger market differentiation/segmentation (beyond just soluble, roast/blend, and specialty segments), improved consistency, new flavor profiles and product innovation, yield improvements, strengthening farmer profitability, and new production systems (agroforestry/shade, regenerative farming approaches, intercropping).

"If we don't innovate, we stay flat."

Buyers strongly emphasized the importance of enhancing farmer profitability to incentivize farmers to stick with or switch to robusta production to meet demand growth, while noting that at the same time there is continued strong consumer demand for low-price coffees. Participants uniformly agreed that diversity of origins is critical to mitigate business risk (e.g., from climate shocks).

Buyers overall are optimistic about the growth of the robusta market, and the potential for innovation to bring new opportunities to farmers and industry. It was widely agreed that in ten years' time, we will see a very different panorama with more high quality robustas, more value added business opportunities in the market and more positive consumer acceptance of robusta.

[1]See ICO trade statistics, total production 1990-present at https://www.ico.org/new_historical.asp

[2]See History of Robusta at https://varieties.worldcoffeeresearch.org/robusta-2/history-of-robusta

Demand

As demand continues to increase, differentiated markets have emerged for robusta, but many are still in their infancy. The demand for robusta coffee continues to increase across three main segments (soluble, roast/blend, specialty). Consumption of soluble coffee has increased significantly and suppliers are noticing growing demand for higher quality robustas (e.g., Grade 2), which have seen supply shortages across the last three years. Lower-grade robustas for the solubles market are primarily being consumed in Asia, often through domestic supply; these consumers prefer low prices. However, the soluble industry is also beginning to differentiate to meet the demand of emerging middle classes for higher quality solubles. There are significant opportunities for the emergence of more differentiated markets tailored to unique markets and consumer preferences.

"The usage of robusta for roast and ground coffee is increasing. It's not all about soluble. It's not only about [chasing similarity to] arabica taste, but also robusta [having its own unique taste]. There is a general trend to recognize this."

Consumer preferences. There is tremendous heterogeneity among consumers around robusta preference, depending on the market. Robusta holds a favorable image in Italy, Eastern Europe and Southeast Asia, but not in the U.S. and other parts of Europe. Robusta's bad reputation is largely connected to low grade preparations, high bitterness, and the aggressive marketing of arabica as a higher-quality/ premium product. However, numerous participants referenced blind consumer taste testing indicating most consumers either do not notice or do not dislike robusta's presence in brewed coffee. According to some market research, younger generations are seeking increased sweetness and decreased bitterness, and this may be an important target for improving robusta. For some robusta consumers, low price is a major driver and will likely remain so, but for a growing segment of the market, value is more important.

"It must come from the consumer. If he doesn't want it, I can't sell something he doesn't want."

"We should recognize and appreciate that there is demand for a cheaper option than an arabica."

"The specialty coffee segment has started to accept fine robustas for products. This is important for the marketing of robusta. If before the specialty sector was very closed for robusta, it is now opening its doors. That will help to break the barriers that consumers have."

Marketing. Brands in the U.S. and parts of Europe are afraid that to disclose robusta as an ingredient would erode brand value. Sourcing teams and quality control departments are generally very open to including more robusta in product development, but marketing teams are steadfast in rejecting it. Buyers have a role to play in educating marketing departments about robusta, which can in turn change public perceptions about robusta.

"We don't get that [negative] perception from final consumers, we get it from the brands and marketing teams. Brands are extremely afraid and want to protect their image. Before we try to change the world and consumers, we need to go first to our own brand teams—education starts at home. The quality people are convinced: there are advantages in taste."

Supply

Supply shortages are already here. There has been a three-year shortage of robusta, and future supply is a major concern. In two decades, the coffee industry will face a deficit of 25 million bags of coffee, perhaps more than half of this robusta. For export markets, demand for upper grades (G2 and above) is increasing more quickly than supply. Given dire predictions about the impact of climate change on coffee production—including on robusta—buyers are very concerned to shore up future supplies.

"[We] need robusta because there will not be enough coffee in the world in the future. It's as simple as that."

Maintaining origin diversity is a priority, but productivity constraints stand in the way. Despite the fact that the world needs more robusta than ever, fewer countries are producing it. Further concentration of supply in Vietnam and Brazil is not desirable—it reduces trading opportunities and creates significant supply risk. But the path to sustained origin diversity is not clear. Brazil diverts most of its robusta for internal consumption; and there is concern about the long-term future of robusta production in Vietnam (some farmers are leaving coffee cultivation for vegetables, fruits and other more profitable crops). Outside Brazil and Vietnam, countries have had persistent difficulties in increasing their yields, and expanding to new land in some areas presents deforestation risks. It is possible that some current Arabica lands and/or marginal lands (e.g., former pasture) may be transitioned to robusta, but this is a long, expensive process that requires significant institutional investment at scale. Uganda is the only major robusta producer whose government has made significant investments to increase robusta production and exports in the last decade. Indonesia produces a lot of robusta, but has struggled to increase productivity. Laos, Thailand, Mexico, Nicaragua, and Colombia have made newer investments to establish or expand robusta production but have not yet created meaningful export supplies, but buyers are watching them.

"We don't want 2 or 3 or 4 countries producing all the world's coffee. It will become a disaster sooner or later."

"We need Brazil. The real concern is whether there will be other origins. We all subscribe to diversity. We do not want Brazil and Vietnam to be alone. We need to take care of other countries."

Farmer profitability is essential. Farmers' profitability is the key for future supply.

"Take care of the farmer first."

"If farmers cannot make a living of it, they will go to cities and move into other things."

Regulatory pressure. Farmers, suppliers, and buyers are facing increasing trade restrictions and regulatory pressure (i.e., ochratoxin, glyphosate, deforestation), which impacts how demand growth can be serviced. In particular, the growth of production in the Amazon region was identified as a risk.

"The regulatory framework is [threatening]. In Europe, [we have] glyphosate restrictions and now deforestation. We tend to forget the pressure on farmers. Legislation on our end makes it difficult for them to reach yield targets."

Future growing systems. In order to meet significant demand increases, it is tempting to urge other countries to shift to a more industrialized farming model as Brazil has done. Industrial production requires higher-yielding varieties, higher-density planting, and mechanical harvesting. However, most countries rely on smallholder production and land consolidation is a politically sensitive topic that most smallholder-dominant producing countries are not interested in. At the same time, climate change is adding drought and heat pressure, and sustainability requirements are at odds with some aspects of industrial farming. More work is needed on adapted approaches to robusta farming like regenerative agriculture, agroforestry systems, intercropping, and reduced chemical input use to increase farmer profitability, decrease environmental impact, and avoid sustainability/brand risks.

"Water usage in Brazil is a massive issue. Sometimes the water stops, they can't irrigate. Can you create a plant that doesn't need as much water?"

"We [need to be] thinking right now on regenerative agriculture, biodiverse farms, shade agroforestry."

Quality needs

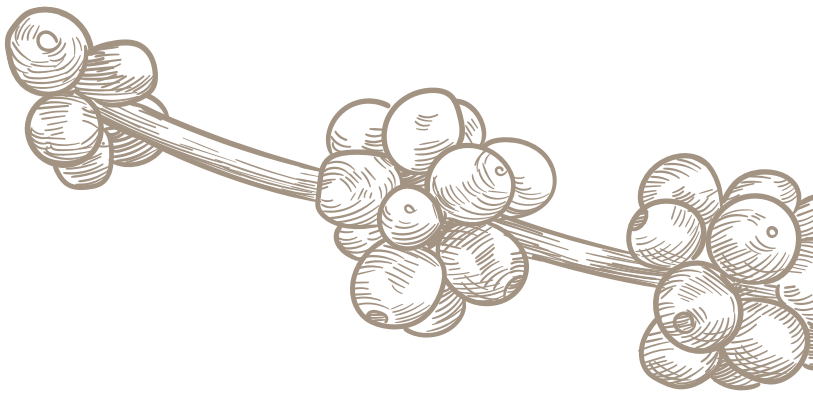
Consistency. Robusta buyers have persistent difficulties with the consistency of robusta quality at all levels. There is major room for improvement in simply implementing higher quality standards, but this has price implications.

There is also the potential to target consistency to some degree through breeding—for example, through developing complimentary clonal lines with similar bean sizes and ripening times.

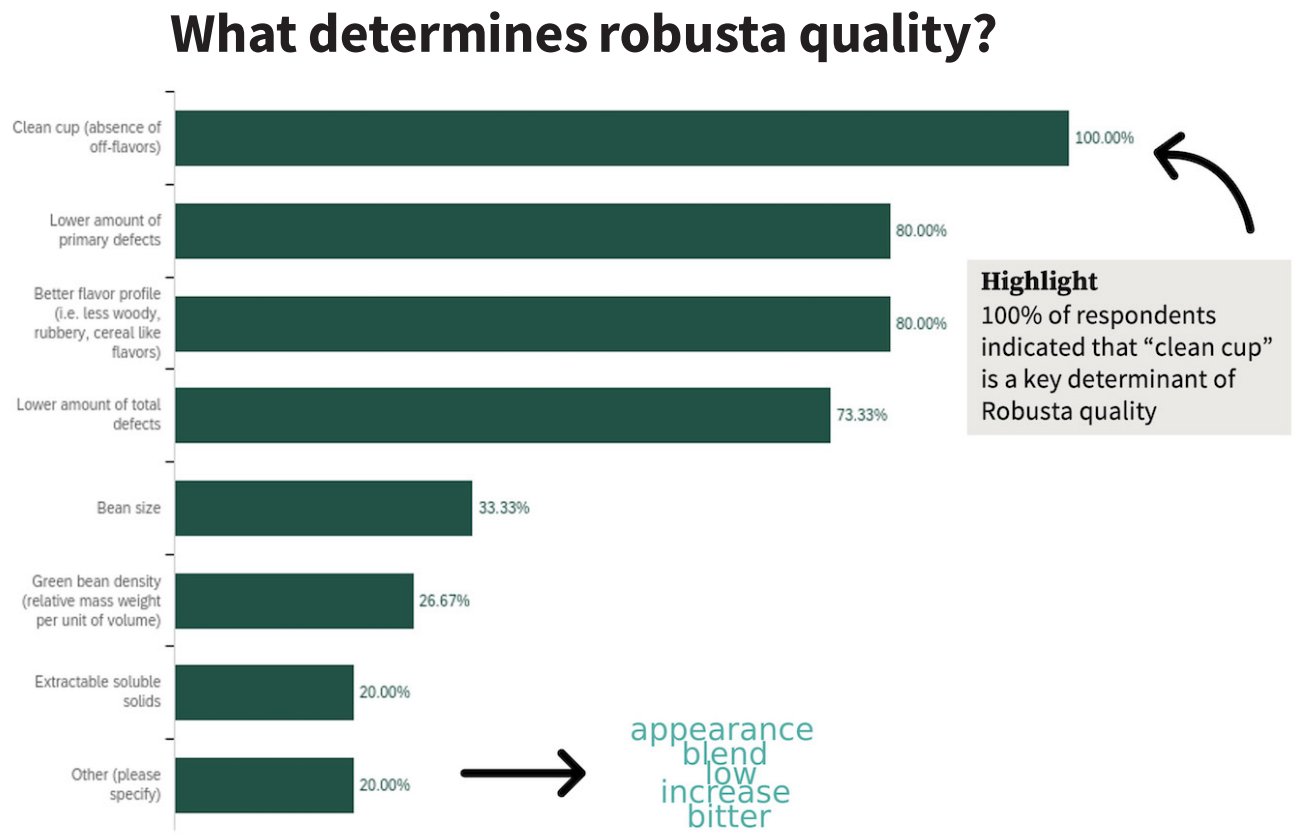
"New varieties in Vietnam are already more homogeneous in terms of screen sizes, much larger, more concentrated."

"Climate change is creating multiple flowering, uneven ripening. Plus farmers like mixing varieties. So you have a mix of small/medium/large bean, early/late ripening. It's very difficult, except Brazil, where the farmer is very disciplined."

"We—the quality people—are convinced, there are advantages in taste."



"You ask for a clean cup because today you can't ask for anything more. But if you have a chance to get robusta with other characteristics, what else do you want? If we limit our thinking to the present, we have no chance to do something new. If we find a new flavor profile, maybe there is a new opening in the future."



1 - Which of the following constitute key determinants of "quality" when it comes to robusta? Check all that apply.

Figure 1. Responses to a pre-focus group questionnaire question regarding determinants of robusta quality

Flavor. Currently, the dominant flavor need is for "clean cup" robustas. However, if the coffee market delivers better quality and more consistent robustas, new flavor profiles would emerge, and the industry may develop new business opportunities in the future. A limiting factor in robusta consumer acceptance is high bitterness; there is overall interest in reducing bitterness and increasing sweetness. However, some or even many Robusta markets continue to prioritize physical traits (e.g., defects, bean size) over taste.

"The idea is to expand a little bit the possibility of robusta. [We all have] different needs—some want strong robusta with chocolate, nothing sweet. Others ask for weak, mild. Roasters need something different to blend in a different way for your style. My opinion is that it is interesting to increase the chance of possibilities, increase the flavors. We need strong, clean, fruity, spicy and other different options."

What defects matter most for Robusta quality?

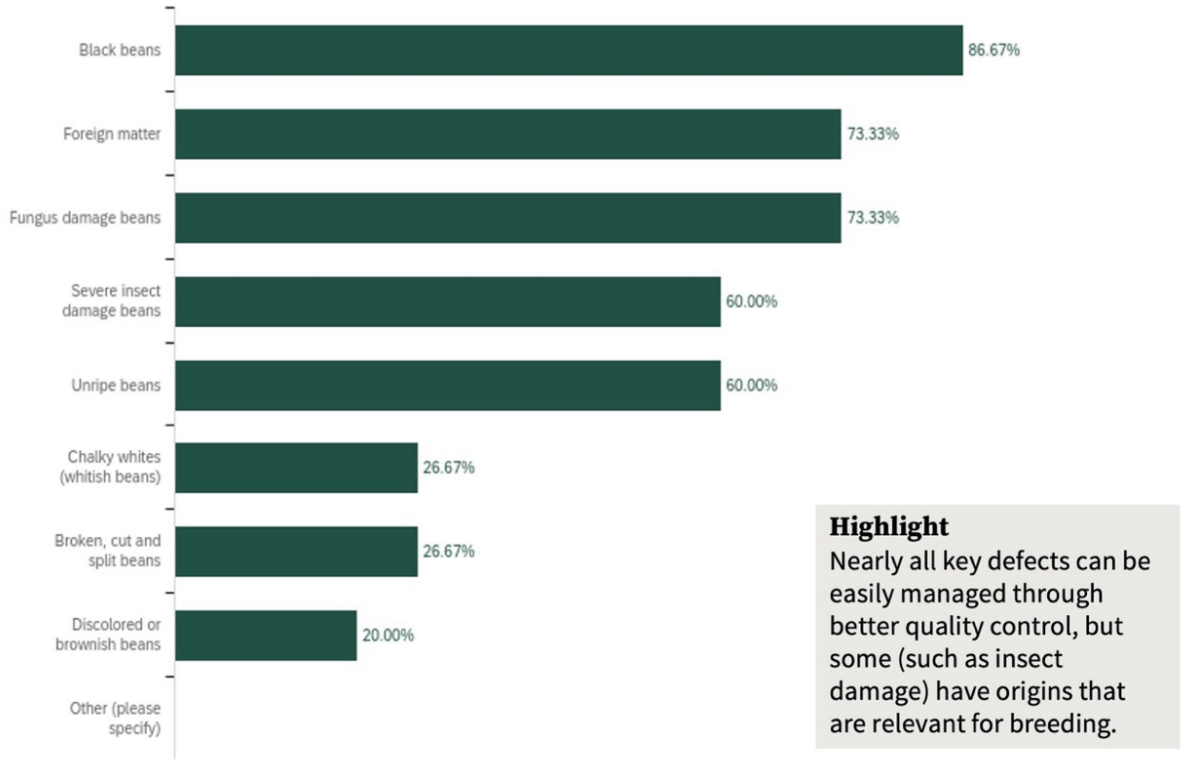


Figure 2. Responses to a pre-focus group questionnaire (n=16) question regarding which defects have the largest impact on quality (n=16).

"For the future, maybe it could be interesting if breeding could change the impact of flavor. Today [the impact of varieties on flavor] is limited. One thing from consumers is [that robusta can be] too bitter. Tomorrow one opportunity is to remove bitterness. Young people like sweet coffee. If we can get sweeter coffee from breeding, from new plants, that is good in future."

Multiple market segments. There was consensus among participants that breeders should not focus only on one markets' needs, but to service all of the main markets when it comes to quality preferences.

"There are different markets. We need everything. Let's not exclude anything. We should include everything. Let's have an overall market that is very diversified, and bring it to origin."

Conclusion: The future of Robusta and the role of breeding

The next two decades are likely to see tremendous growth and evolution in both robusta demand and supply. There is major opportunity for differentiated market segments to develop and mature, but sustaining supply to service these markets is a huge challenge that will require significant improvements in productivity, the likely need to expand robusta production into new areas, and further efforts on quality differentiation. In short it will require innovation—which means that there will be significant risks to evolve the market. These risks will either be borne by farmers, suppliers, roasters, producing countries—or, more likely, all of the above. There is a desire to spread and share the risk as widely as possible.

> "Someone always has to be the first, in everything from electric cars to windmills. It has to be the farmers or business, someone has to take a risk."

In the context of these changes, there is a key role for breeding to play in helping support both increased productivity, increased overall quality, and increased market differentiation. But the success of any new varieties will also depend on institutional support and investment in origins. Robusta's success will be built on two pillars: innovation and collaboration, including institutional support for both. Agricultural innovation on its own will not bring about meaningful changes.

> "Going back to innovation, there is plenty of room, but we are just discovering things. Like any other innovation project, there are risks involved. To push these innovation steps, we really need collaboration and innovation in the industry to share the risks."

Industry goals for robusta breeding

- Farmer profitability
- Increased productivity
- Disease resistance
- Market differentiation
- Consideration of future needed growing systems
  - Shade/agroforestry
  - Intercropping
  - Suitable for low or no till
  - Carbon-negative
  - Mechanical harvesting
  - High planting density
  - Low chemical pesticide/fungicides
- Taste/flavor
  - Overall: less biterness, more sweetness (recognizing some consumers prefer strong, bitter flavor)
  - Differentiated flavor profiles (e.g., neutral, fruity, spicy)
  - Consistency is key
- Physical attributes
  - More uniform bean size

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