

Challenge Brief

Challenge title:	Control and prevention of <i>Alternaria</i> disease and associated mycotoxins in industrial tomatoes
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1. Brief description of the business process context of the challenge to be addressed

The company processes industrial tomatoes into pastes, sauces, and concentrates for the domestic and export markets. The tomatoes are sourced mainly from third-party fields, with planting beginning in September and harvesting extending through March-April. *Alternaria* disease, caused by the fungus *Alternaria spp.*, recurrently affects tomato crops and has become critical in recent seasons. Some *Alternaria* species can also produce mycotoxins that persist in the fruit and enter the processing line, with direct implications for food safety and compliance with destination-market requirements.

In this context, the company seeks to:

1. Reduce in-field losses associated with *Alternaria* disease.
2. Reduce *Alternaria* mycotoxin levels in fruit entering the processing plant.
3. Have validated solutions available for deployment from the next growing season.

2. Description of the technological challenge associated with the business need outlined above

The problem has two main impacts. First, defoliation and fruit rot reduce crop yield and soluble solids content (°Brix), a critical parameter for the industrial performance of the product. Second, mycotoxin contamination compromises finished-product safety and exposes the company to increasingly stringent international regulatory requirements.

Alternaria infection is favored by high relative humidity, temperatures of 20-30 °C, and prolonged periods of leaf wetness caused by dew, rainfall, or sprinkler irrigation. The pathogen is a polycyclic fungus that survives in crop residues, soil, and seed, allowing inoculum pressure to build from season to season. *Alternaria* species associated with tomato can produce tenuazonic acid (TeA), alternariol (AOH), and alternariol monomethyl ether (AME). These heat-stable mycotoxins can withstand conventional industrial processing, including pasteurization and other thermal treatments, and may become concentrated during evaporation. Commission Recommendation (EU) 2022/553 establishes indicative monitoring levels for processed tomato products (AOH 10, AME 5, and TeA 500 µg/kg), with the expectation that these recommendations will evolve into binding limits.

The critical point is that the problem cannot be effectively addressed at the processing stage. Fruit with no visible symptoms may still contain mycotoxins, and neither postharvest washing with chlorinated water nor other treatments at the processing plant remove toxins that have already formed. The solution must therefore act by preventing *Alternaria* infection and mycotoxin production before the fruit is harvested. Current control relies mainly on chemical fungicides, an approach that has become increasingly constrained because residue requirements limit access to export markets. Additionally, resistance to major fungicide groups (strobilurins, SDHIs, and triazoles) has been documented in *Alternaria*, reducing field efficacy. Cultural practices, including crop rotation, removal of crop residues, and irrigation management to minimize leaf wetness, provide the low-cost foundation of disease management. However, the company has limited control over these practices because the fields are owned and managed by third parties. Late-season harvests (February-March), which are more exposed to rainfall, represent the period of greatest risk.

3. Minimum and ideal requirements for a solution to be considered

Minimum requirements

- The solution is applied in the field (pre-harvest) rather than at the processing plant.
- The solution reduces the incidence of *Alternaria* disease and/or the production of *Alternaria* mycotoxins (TeA, AOH, and AME) in the fruit.
- The solution complies with export regulations and leaves no residues that would exceed the maximum limits (MRLs) set by destination markets.
- The solution can be applied using the machinery, logistics, and standard practices currently used across third-party fields (>4,000 ha).

Ideal requirements

- The solution can be tested as a pilot during the 2026–2027 growing season.
- The solution demonstrates a measurable reduction in mycotoxin levels, not only foliar symptoms.
- The solution integrates with the existing crop protection program and with monitoring or early-warning systems.
- The solution's efficacy is supported by independent statistical validation.

4. Additional comments on the expected solution

- The search is focused on biological control solutions, biorational products, and elicitors. Conventional chemical approaches are constrained by export market residue requirements and fungicide resistance, while gene-editing approaches are excluded because they do not fit the required implementation timeline.
- The company is open to lower-TRL solutions provided they are supported by a sound technical rationale. Its agronomy team has strong technical capabilities and is willing to conduct hectare-scale field trials when justified by the available evidence.
- The company is interested in working both with companies and startups offering ready-to-deploy products and with universities or research centers capable of co-developing new solutions. Independent third-party involvement in statistical analysis is also being considered.