



Agrolocale Agronomic Practices And Cultivation Yield Report (PEPPER)

A Food Security Project By



Agrolocale

01 Summary

Agrolocale Investment Limited previously communicated to clients an investment plan for open-field pepper production based on **10,000 plant stands per acre, with an expected yield of 15,000 kg per acre, equal to an average of 1.5 kg per stand.**

Following completion of the production cycle, the actual average yield recorded **was 0.5 kg per stand, equal to 5,000 kg per acre. This is 10,000 kg, or 66.7 percent, below the original projection.**

This report explains why the shortfall occurred, presents the supporting figures, and sets out the revised planning basis, the change in plant spacing and the other measures the Company is taking in response.

The shortfall is attributed mainly to the production environment: severe infestations of sucking insects and mites, fungal and bacterial diseases, nematodes, and unpredictable and unfavourable weather that reduced flower retention and the conversion of flowers into fruit. These pressures can be reduced with correct pesticide application and good agronomy, but they cannot be eliminated, and they continue to lower yield even when well managed. Dense planting also reduces ventilation and air flow within the crop canopy, which favours pests and disease. For this reason the Company will use a wider plant spacing, and therefore a lower plant population per acre, in future cycles.

02 Background And Original Investment Plan

The original plan was built on a standard planting density of **10,000 stands per acre and an expected yield of 15,000 kg per acre, which is 1.5 kg per stand**. That figure was communicated to clients as the basis for expected returns.

Projections of this kind assume that crop management, pest and disease pressure, and weather remain within the range that allows the crop to approach its yield potential. Open-field pepper production is highly sensitive to each of these conditions, and the gap between potential and realised yield can be wide in a season where several stresses occur together.

03 Actual Performance Compared With The Plan

Table 1 compares the planned and actual results. The number of stands was unchanged. The difference arises entirely from lower average fruit output per stand, which fell from **1.5 kg to 0.5 kg, a reduction of 66.7 percent**.

Table 1: Planned versus actual yield per acre

Parameter	Original plan	Actual result	Variance
Plant stands per acre	10,000	10,000	0
Average yield per stand (kg)	1.5	0.5	-1.0 (-66.7%)
Total yield per acre (kg)	15,000	5,000	-10,000 (-66.7%)
Yield achieved relative to plan	100%	33.3%	-66.7 points

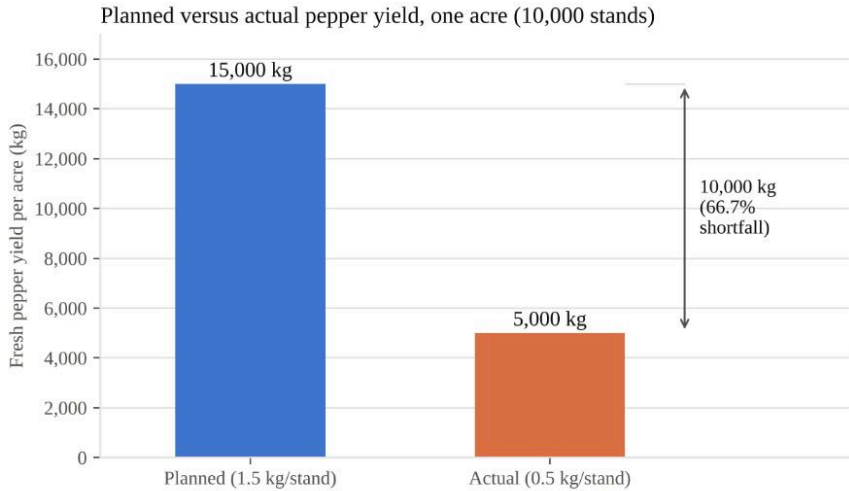


Figure 1: Planned and actual yield per acre

Figure 1 shows the gap between the two outcomes.

The Company achieved **33.3%** of the originally projected output per acre. The remaining **66.7%** was lost to the production factors described in the next section.

04 Factors Responsible For The Yield Shortfall

Open-Field Production System

The crop was grown in an open field, without the protection a greenhouse or net house provides. In open field the plants are directly exposed to rainfall, wind, temperature swings, soil-borne organisms and migrating insects. Each of these can reduce yield, and several often occur together. Protected cultivation moderates many of these risks but requires much higher capital cost, which is why the original plan was based on open-field production.

Severe Infestation By Sucking Insects And Mites

The crop suffered severe infestations of thrips, aphids, whiteflies, spider mites and broad mites. Thrips scar leaves, flowers and fruit and cause flowers to drop. Aphids and whiteflies suck sap from leaves and shoots, weaken the plant and can spread plant viruses. Spider mites and broad mites feed on leaf and shoot tissue, causing bronzing, leaf curling, stunted growth and deformed flowers and fruit. These pests are small, multiply very quickly and are often found on the underside of leaves or inside growing tips, so they are difficult to reach with sprays and can reinfest a field soon after treatment.



04 Factors Responsible For The Yield Shortfall

Fungal And Bacterial Diseases

The crop also experienced outbreaks of fungal disease, bacterial leaf spot and other bacterial diseases. Fungal diseases damage leaves, stems and fruit, reducing the plant's capacity to produce and fill fruit. Bacterial leaf spot causes spotting and loss of leaves, which reduces the leaf area available to feed the plant, and other bacterial diseases can cause wilting and fruit lesions. These diseases spread through water splash, wounds and handling and are favoured by humid and wet conditions.

Nematode Infestation

Nematode infestation damaged the root system of affected plants. Damaged roots absorb less water and fewer nutrients, which leaves plants stunted and less productive even when fertiliser and irrigation are applied correctly. Because nematodes live in the soil, they are difficult to eliminate once established in an open field.



04 Factors Responsible For The Yield Shortfall

Unpredictable And Unfavourable Weather

Weather variability affected the crop at the most sensitive stage of its production. Pepper plants flower continuously, and extremes of heat, rainfall and wind reduce the number of flowers that are retained on the plant and the proportion that convert into fruit. Weather also affected how well plants take up nutrients and how well sprays are absorbed and retained, which lowered the effectiveness of nutrition and crop protection programmes. Flowers lost to weather cannot be recovered by any later input.

Limits Of Chemical Control

The Company applied pesticides as part of its crop protection programme. Correct pesticide use can reduce the severity of pest and disease outbreaks to a considerable extent, and the Company will continue to rely on it. However, chemical control reduces losses rather than removing them. Crops that are attacked still lose some yield before and during treatment, treatments are less effective in adverse weather, and pest populations can develop resistance over time. For this reason, even a well-managed open-field crop will usually yield below its potential in a season with significant pressure.



Table 2: Summary of yield-limiting factors

Factor	How it reduces yield	Control available
Thrips	Rasp leaf, flower and fruit surfaces, causing leaf curl, flower drop and scarred fruit; can also spread plant viruses.	Scouting, sticky traps, rotated insecticides; populations rebuild quickly.
Aphids	Suck sap from young shoots and leaves, weaken plants, distort growth and can spread plant viruses.	Scouting, targeted insecticides; re-infestation from surrounding fields.
Whiteflies	Feed on the underside of leaves, reduce plant vigour and can spread plant viruses.	Traps, scouting, rotated insecticides; resistance can develop.
Spider mites and broad mites	Feed on leaf and shoot tissue, causing bronzing, leaf curling, stunting, and deformed flowers and fruit.	Miticides, scouting; outbreaks recur in hot, dry weather.
Fungal diseases	Damage leaves, stems and fruit and reduce the plant's capacity to produce and fill fruit.	Fungicide programme, pruning, spacing; cannot fully prevent losses.
Bacterial leaf spot and other bacterial diseases	Cause leaf spotting, leaf drop, wilting and fruit lesions; spread through water splash, tools and wounds.	Sanitation, field hygiene, copper-based products; limited curative options.
Nematode infestation	Root damage reduces water and nutrient uptake, so plants are stunted and under-yielding.	Crop rotation, soil management, nematicides; partial control in open field .
Unpredictable weather	Heat, heavy rain and wind reduce flower retention and the conversion of flowers into fruit, and reduce the effectiveness of nutrients and sprays.	Fertigation and spray timing, staking; no control over weather itself.



05 Data Analysis: Sensitivity Of Yield To Performance Per Stand

Because the planting density used in this cycle was fixed at **10,000 stands per acre**, total yield moves in direct proportion to the average yield per stand. **Each change of 0.1 kg per stand changes total yield by 1,000 kg per acre**, which is 6.7 percent of the original 15,000 kg projection.

The observed average of **0.5 kg per stand** therefore corresponds to **5,000 kg per acre**, or **33.3 percent of plan**.

Table 3: Yield per acre at different average yields per stand

Yield per stand (kg)	Yield per acre (kg)	% of original plan	Remark
0.3	3,000	20.0%	
0.5	5,000	33.3%	Observed result
0.7	7,000	46.7%	
0.9	9,000	60.0%	
1.1	11,000	73.3%	
1.3	13,000	86.7%	
1.5	15,000	100.0%	Original plan

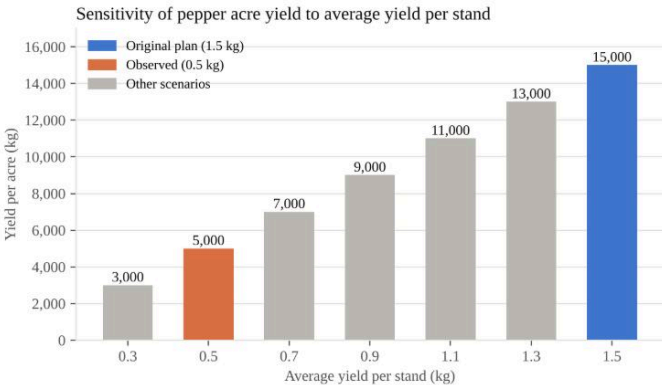


Figure 2: Yield per acre at different average yields per stand

The sensitivity analysis shows that a small change in average yield per stand has a large effect on total output. It also shows why a planning figure should reflect the yield that can reasonably be achieved under open-field conditions rather than the highest yield the variety can reach under ideal conditions.



06 Revised Investment Plan Basis

In light of the observed result, the Company has adopted the recorded average of **0.5 kg per stand** as the starting point for planning open-field pepper production.

At the previous population of **10,000 stands per acre**, this corresponds to **5,000 kg per acre**, compared with the **15,000 kg communicated earlier**. The Company considers this a more realistic and prudent basis, because it comes from measured field performance and not from an estimate of yield potential.

Because the plant population will change under the new spacing described in Section 7, future per-acre targets will be set from expected performance per stand at the new spacing, and not by multiplying the 0.5 kg figure by 10,000 stands.

The Company will publish the revised spacing, plant population and yield target in its updated investment plan.

07 Revised Plant Spacing And Plant Population

A planting density of 10,000 stands per acre places plants close together. In an open field this restricts air movement through the canopy, keeps leaves and stems wet for longer after rain or irrigation, and creates a warm, humid microclimate in which thrips, mites, whiteflies, aphids and diseases build up easily. Dense canopies also make scouting, spraying and pruning harder, so spray coverage is poorer and pests are found later. The same plant spacing principles that the Company is applying to its tomato production apply equally to pepper.

The Company will therefore increase the spacing between plants and rows in future cycles, which lowers the plant population per acre. Proper spacing is expected to help in the following ways:

- **Better ventilation and air flow:** air moves more freely through the canopy, so leaves dry faster and conditions favouring disease and pests are reduced.
- **Lower pest and disease pressure:** less leaf-to-leaf contact and less humidity slow the spread of insects, mites, fungal and bacterial problems.
- **Better spray coverage:** pesticides reach the underside of leaves and growing tips more evenly, which improves their effectiveness against small pests.

07 Revised Plant Spacing And Plant Population

- **Less competition between plants:** each plant has more light, water and nutrients, which supports better flower retention and fruit set
- **Easier field operations:** pruning, staking, scouting and harvesting can be done more quickly and with less damage to plants.

Fewer stands per acre means each stand must perform better for the Company to reach its yield target.

The Company believes that healthier plants with more room to grow can achieve a higher average yield per stand than the 0.5 kg recorded in this cycle.

This is a management objective and not a guarantee, and results will continue to depend on pest, disease and weather conditions.

08 Other Measures To Manage Risk And Improve Yield

In addition to the change in plant spacing, the Company is taking the following steps to reduce the impact of the factors above in future cycles. These measures are intended to improve results but are not a guarantee of any specific yield.

- **Adopting staggered planting:** Transitioning to staggered planting is our Agronomic measure to reduce our glut risk, improve consistent market supply across an harvest duration, reduces the pressure on labor management and make up for price variations
- **Integrated pest management:** regular scouting for thrips, aphids, whiteflies and mites so that infestations are caught early, with traps, and timely and correctly rotated pesticides to limit resistance.
- **Disease management:** preventive fungicide and bactericide programmes, removal of infected plant material and cleaning of tools to limit spread.
- **Soil and nematode management:** crop rotation, soil preparation and soil testing to lower nematode pressure before planting.
- **Flower retention and nutrition:** balanced fertigation scheduled around weather conditions to support flowering and fruit set.

08 Other Measures To Manage Risk And Improve Yield

- **Staking and support:** stronger and better-anchored support structures to reduce plant damage during storms.
- **Variety selection:** evaluation of varieties with better tolerance to the local pest and disease complex.
- **Record keeping:** continued yield measurement per plot and per stand so that future plans rest on recorded data.



Conclusion

The Company's actual yield of 0.5 kg per stand, against a planned 1.5 kg, was caused by the combined effect of severe infestations of thrips, aphids, whiteflies, spider mites and broad mites, fungal and bacterial diseases, nematode infestation, and unpredictable and unfavourable weather that reduced flower retention and fruit set in an open-field setting. Pesticides and good agronomic practice reduce these losses but cannot remove them.

The Company has revised its planning basis to the recorded 0.5 kg per stand, will adopt a wider plant spacing to improve ventilation and air flow, and is strengthening its crop protection and field management to protect future performance.

Agrolocale Investment Limited values the trust of its clients and the public and remains committed to transparent reporting of results as they are recorded.

Management

Agrolocale Investment Limited

