

# Quality of apple trees and apples in poultry free range areas

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**Introduction** An increasing number of poultry free range areas contain fruit trees as shelter for the chickens and to have some additional revenues for the farm. A professional orchard is only affordable if it is managed professionally and if there is enough good quality harvest. Research questions:

1. Are there any differences in tree health in relation to the distance to the stable?
2. Are there any differences in fruit quality in relation to the distance to the stable?

Distance to the stable is a measure for chicken density: close to stable a high density and stronger effects are expected.

**Methods** Investigations were done in orchards of 2-3 years old on 2 farms on 20, 50, 150 en 300 meter distance from the stable. Tree health was investigated by

1. counting dead and very weak trees
2. scoring growth rate of the trees
3. measuring tree heights
4. scoring leaf quality
5. counting the number of apples per tree.

Fruit quality was scored as damages/quality problems on the outside of a sample of 10 arbitrary chosen apples per tree.

The investigations are continued from May 2016 on.

## Results

Table 1. Qualitative aspects of tree health and fruit in relation to distance to the stable

| Parameter        | Effect closer to the stable                              |
|------------------|--|
| Shoot growth     | Less and shorter shoots                                  |
| Tree growth      | Lower trees  |
| Leaf quality     | Lower quality  |
| Number of apples | More apples on farm 1; no effect on farm 2               |
| Fruit quality    | More damaged apples: apple scap, blackrot, insect damage |

See our abstract for details and differences between apple breeds.



Wet and bare soil close to the stable (50 m)



Situation further away from the stable (200 m)

## Conclusions

- Fruit and poultry do combine well during the first years after establishment of the orchard: good harvests can be achieved.
- If fruit is grown in a poultry free range area, measures are needed to compensate for the chickens' effects: cheaper/robust trees more close to the stable, soil management and dewatering.
- In organic fruit farming apple scab slowly increases over the years. Perhaps chickens can be of use by eating the leaves or speeding up decomposing the leaves in autumn and winter.

### Acknowledgements

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## QUALITY OF APPLE TREES AND APPLES IN POULTRY FREE RANGE AREAS

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### Introduction

An increasing number of poultry free range areas contains more and more trees. In the project 'Trees for chickens' fruit seemed to be a suitable plantation type for poultry free range areas. The costs of layout of an orchard will go up to 36,000 euros per hectare. This is only affordable if the plantation is managed professionally and if there is enough good quality harvest. However, there is only limited experience with growing professional fruit in poultry free range areas. This report is the result of an investigation on two organic poultry farms in The Netherlands with a professionally planted and managed apple orchard. The research questions were: 1) Are there any differences in tree health in relation to the distance to the stable? 2) Are there any differences in fruit quality in relation to the distance to the stable? The further away the trees are located from the stable (or more precise: the pop holes) the less chickens are expected to be around those trees and the smaller will be the expected effects of the chickens on those trees.

### Material and methods

On farm 1 investigations were done on approximately 20, 50, 150 en 300 meter distance from the nearest pop holes. On farm 2 investigations were done on approximately 40, 50, 120, 140 and 200 meter distance from the pop holes. Tree health was investigated by 1) counting dead and very weak trees, 2) scoring growth rate of the tree in terms of shoot growth and express this in a number on a scale from 0 to 10 with 5 as 'ideal' in a fruit growing context, 3) measuring tree height and express it in centimeters, 4) scoring leaf quality and express it in a number on a scale from 0 to 10 with 10 as 'perfect' and 5) counting the number of apples per tree. Fruit quality was scored as damages/quality problems on the outside of a sample of 10 arbitrary chosen apples per tree and was expressed in no problem, small damage (but still marketable) or big damage (not marketable anymore).

### Results

General management of the fruit orchards. There was a big difference in general appearance of the fruit orchards on the two chicken farms. On farm 1 the management of the fruit trees was clearly behind schedule. For example there had been no recent proper pruning and supporting of the young trees, leading to broken branches and stems. On farm 2 the orchard was intensively managed and these problems did not occur.

The expectancy that with a larger distance from the popholes, there will be less chickens' influence, is confirmed and illustrated by the pictures in **Figure 1**.

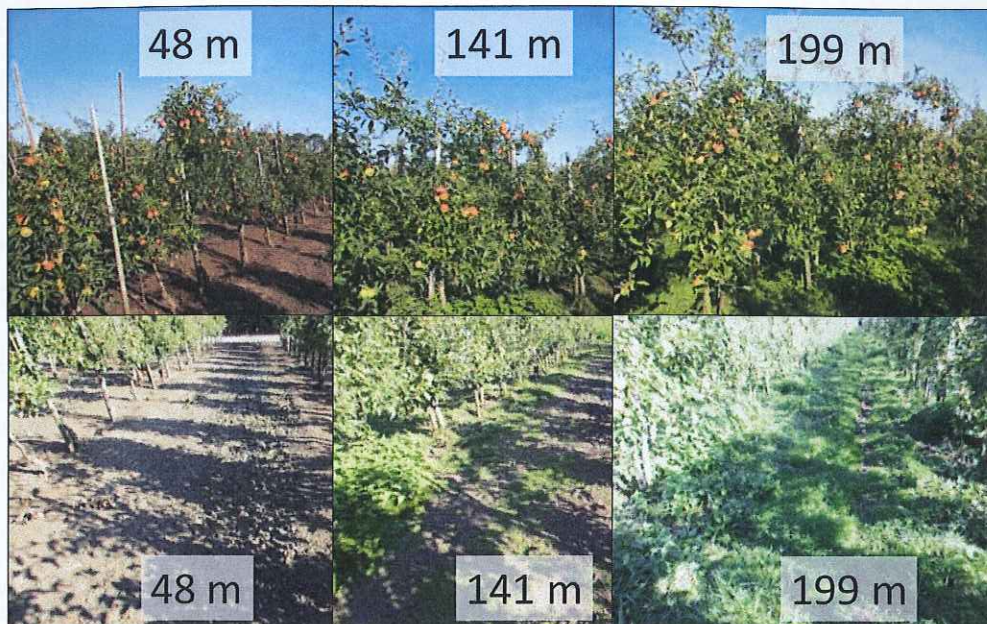


Figure 1: General image of Dalinco apple trees on farm 2 in relation to the distance from the stable.

**Mortality: dead and very weak trees.** On farm 1, very locally, there was an area with 40% mortality among the trees. There was no relation with distance to the stable, so it was not the chickens causing this mortality. According to the poultry farmer, the mortality was caused by extreme wetness of the parcel. On farm 2, on less than 50 meter from the pop holes, there was more than 10% mortality among the Santana trees. On farm 2 there was no mortality among the Dalinco trees.

**Growth and tree heights.** Growth varied on both farms from precisely optimal to not yet optimal. There was a clear relation with the distance to the pop holes: closer to the stable the trees showed less growth. The effect is to be seen till 100-120 meter from the pop holes. Tree height is only measured on farm 2. On farm 1 the trees were still very young. Closer to the pop holes the trees were lower (appr 210 cm high) than further away (appr 275 cm high). This effect is to be seen till 100-120 meter from the pop holes.

**Leaf quality (Figure 2).** Closer to the stable leaf quality was lower than further away. This effect was to be seen till 50 meters from the pop holes. The effect was relatively stronger in Santana than in Dalinco.

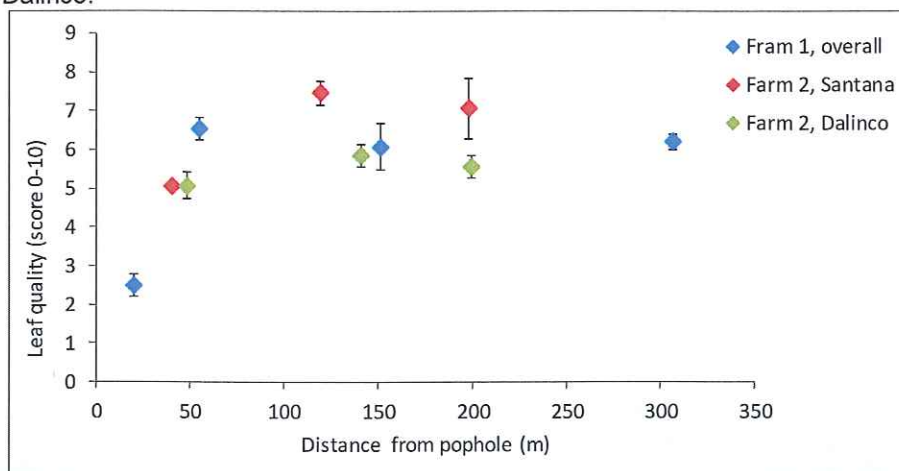


Figure 2: Leaf quality in relation to distance to the stable on both farms



**Number of apples (Figure 3).** On farm 1 the trees were smaller and they had less apples (mostly 40 per tree), especially when located further away from the pop holes (less than 10 per tree), in the part with also the high mortality among the trees. On farm 2 quite a number of apples was counted on the trees (70-80), while there was no relation with the distance from the pop holes. Per hectare this would mean a yield of 35 – 45 tons for this orchard, which is rather high.

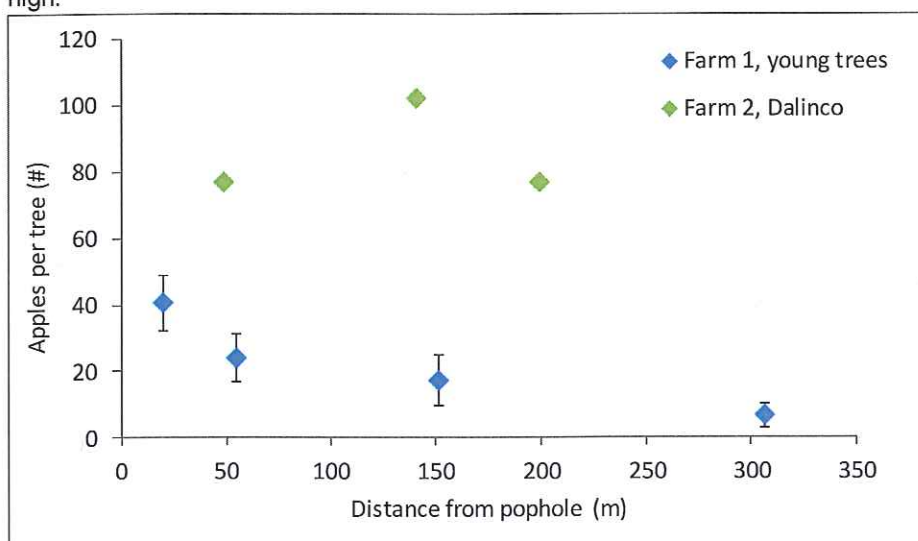


Figure 3: Number of apples in relation to the distance from the stable.

**Fruit quality (Figure 4).** On farm 2 apples were scored shortly before the harvest. There was a clear relation with distance to the pop holes: further away the percentage of damaged apples was lower. At 50 meter distance from the pop holes a mean of 13% of the apples was damaged to such a degree that they were no longer marketable. Damaged apples were mostly (i) infected by apple scab, (ii) infected by blackrot (*Diplodia seriata*) or (iii) damaged by insects.

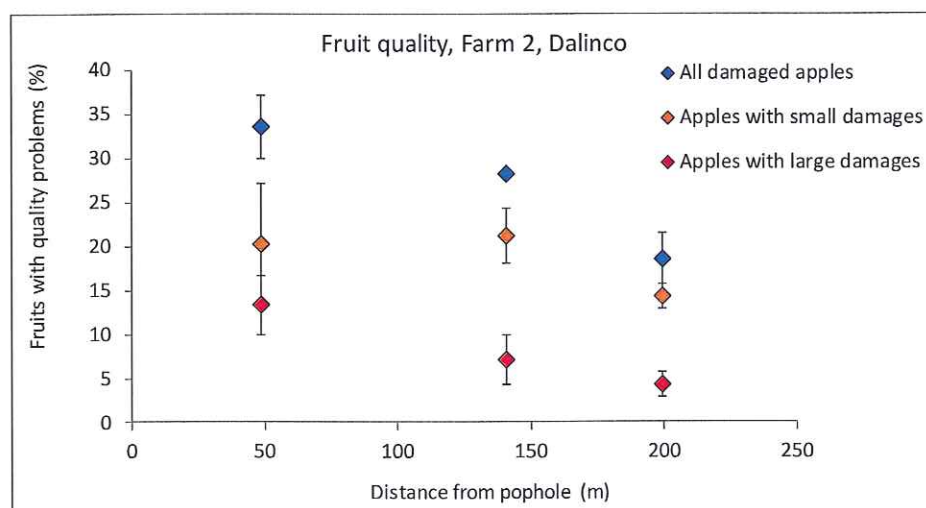


Figure 4: Quality of Dalinco apples in relation to the distance from the stable shortly before harvest.

**Differences between Dalinco and Santana.** On farm 2 two apple cultivars were compared with each other: Dalinco and Santana. The growth of Dalinco decreased less than the growth of Santana, with decreasing distance from the pop holes. Also, leaf quality was relatively less effected in Dalinco than in Santana, with decreasing distance to the pop holes.

#### Conclusion and recommendations

On farm 1 general management of the orchard was behind schedule, leading to damaged branches and trees with unfavorable shapes. This confirms that for fruit farming other skills are needed than for poultry farming. Farm 2 showed that during the first years the harvest can be good. If fruit is grown in a poultry free range area, compared to an orchard without chickens, a number of measures is needed to compensate for the chickens' effects. More close to the

stable, it has no sense to plant expensive fruit trees and cheaper and robust trees would be more sufficient. More close to the stable soil management and dewatering are necessary. Perhaps additional nutrients for the leaf can improve leaf quality close to the stable. Although we did not investigate it, chickens could as well have advantages for the trees: less soil management and less weed control necessary, less harmful insects to be expected and perhaps there is a higher number of fruits and less deceleration may be needed. Anyway, fruit and poultry do combine well during the first years after establishment of the orchard. However, the experience in organic fruit farming is that apple scab slowly increases over the years. Perhaps chickens can be of use in the case of scab, because if the leaf disappears during winter (are eaten by the chickens and/or decompose), then the risk of scab decreases. The future must show how diseases will develop. Further monitoring and resistance management are recommended. Thereby possible differences between apple cultivars should be taken into account.

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