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FEASIBLITY STUDY ON LOW-TRELLIS HOP PRODUCTION

on the property of researcher
Robert Ebersold in Handschuheim

1) Report on the 2004 campaign
2) Financial report on the method

Study conducted in agreement with the Association Générale des Producteurs de Houblon de France *(AGPH) [French Association of Hops Producers].*

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The low-trellis hopyard was seriously weakened by the drought of 2003. As a result, numerous crowns dried up for lack of water. Other crowns were destroyed or weakened by rodents that infested the plot.

1) Hop growth and development:

- **Beginning of growth**: Contrary to the previous years, the plants had a lot of difficulty getting started in April. The lack of energy reserves in the deeper roots is probably the reason for both the slow start and the plants' weakness. During April, it seemed that many of the crowns would deteriorate due to their weakened state from the previous year's drought. In reality, many crowns that suffered through the dry period made a gradual comeback, but they developed fewer and less substantial vines than usual.

- **Growth in length:** In May, the vines developed very slowly at first and in fewer numbers than usual. The vines did not branch out much, which made them look more like mini hops crowns instead of a wild tangle of vegetation. On average, two vines grew vertically with laterals growing horizontally, but the latter remained relatively short.

- **The hop reached the three-meter high top of the trellis by May 25, on 2004.** The vegetation density remained relatively low for the bottom half of the plants. The top of the plants showed average vegetation density.

- **Trimming was performed twice:** May 24 and June 10. The vines grew rapidly to attain the last meter of height and badly needed trimming. The trimmer acquired for research at the *Lycée Agricole d'Obernai* (LAO) [Obernai Agricultural Secondary School] was repaired to perform this job. Trimming limited top development, which made harvesting easier.

- **The first flower-producing branches appeared around June 15.**

- **Flowering began June 25 and gradually progressed from there.**

- **Cones began developing July 15.**

- **The cones reached maturity around August 20.**

2) Crop maintenance:

- **Pruning:** The trellising design does not allow pruning. The hopyard was designed to eliminate pruning in order to save on this operation.

- **Fertilizer:** Plot management was designed around minimizing production factors to meet two criteria: Being as environmental as possible, and minimizing production costs. Thus, since 1996, the plot has not received basal dressing. In 2003 and 2004, we spread 40 units of nitrogen (in the form of ammonium nitrate) on the row during the active stage of vegetation in the month of June.

- **Defoliating the row:** A chemical treatment was performed on May 7th, on 2004. In 2003, we performed a thermal defoliation to minimize chemical production factors. The nearby presence of a 20-cm high plastic training twine limited us to defoliating vegetation that had spread into the alleyway and only very slightly affecting the row. In 2004, the experimenter performed a very lightly concentrated chemical defoliation to limit the development of detrimental grasses on the row outside the planted grass.

- **Protection against downy mildew:** The researcher performed four treatments with copper at one quarter the recommended quantity of spray mixture per hectare under production (in full vegetation) or 250 liters of spray mixture per hectare.

- **Protection against powdery mildew:** Close surveillance of the plot enabled good containment of risk factors linked to the disease. Pressure was low in 2004. Three treatments were performed using the products recommended by COPHOUDAL [Alsatian Hops Growers Cooperative].

- **Protection against mites:** The plot was infested with mites. The researcher performed one treatment with acaricide to protect the cones on August 7, 2004. This treatment was performed as a preventive measure to cover the time remaining before the harvest in case of a significant increase in the mite population in the meantime. Prior to planting grass in the alleyways, the campaign against these pests was the primary plant protection concern for the plot. The line of trees along the access road to Handschuheim is regularly attacked by this pest. The closest hopyard was probably contaminated due to its proximity.

- **Mulching the grass:** The lack of nitrogen fertilizer in the grass-covered alleyway noticeably slows the growth of grass cover, which is already composed of slow-growing types and varieties. In 2004, the researcher performed eight mulching operations. It is the most time-consuming crop maintenance operation outside of harvesting. A more powerful mulcher would enable a 75% reduction in work time for this operation.

- **Soil work:** No work was performed on the soil in the row or in the alleyway.

3) Harvest:

- **Harvester:** The tractor-drawn harvester was improved and made more reliable during previous harvests. One negative point persists since it was acquired: the weakness of the links between the drive chain and both product conveyor belts. Brackets inserted in the chain links break, which lead to an extended work stoppage to replace the defective part. For future use of the machine, it is absolutely necessary to counter this weakness. The harvester enables about one hectare per eight hours to be harvested when it is working. To facilitate turning around at the end of a line, and by extension to save time, a space of about eight to ten meters is needed to turn without extra maneuvering.

- **Transporting the harvested product:** This was accomplished with two trailers that dumped the harvest product in front of the harvester. For large-scale farming, a container with a moving bottom that directly dumps the harvest product into the sorter would be required.

- **Picking up the harvest product for sorting:** This operation was performed by two people who fed a traditional harvester with pitchforks. This method is possible for experimental purposes. The sorter would have to be fed by a mechanical device to reduce work time, and to ensure a regular supply, which guarantees efficient sorting.

- **Drying was performed with a traditional drier in a kiln.**

- **The product was packaged at the farm in square bales.**

- **Delivery to COPHOUDAL was arranged a few days after the end of the harvest.**

4) Work time:

Low-trellis growing is supposed to minimize work time.

Summary of work time in 2004 with available resources:

Operations	Number of operations	Hours per operation	Total work time
Unearthing, pruning	0		0
Setting up training twine	0		0
Leaf stripping + training onto twine + retraining onto twine	0		0
Spreading fertilizer (manual)	1	3	3
Grass mulching	8	1.5	12
Soil work	0		0
Plant protection: - insecticides - fungicides	2 7	1 1	2 7
Defoliation	1	1	1
Harvesting in the field + transport	3 people		24
Sorting	2 people		16
Total per hectare			**65 hours**

What reductions can still be made for large-scale low-trellis hops growing?
- **2 hours with mechanical fertilizer spreading**
- **50% or 6 hours with better adapted mulching equipment**
- **16 hours with a mechanical sorter supply**

This is a potential reduction of 24 hours, which would cut work time to around 40 hours per hectare, or around 1/6 that of traditional systems.

Drying, packaging, and delivery are identical procedures to those used in traditional hop growing.

5) Reductions from growing hops on a low trellis

- Production factors:

Fertilizer: 1/4 of conventional fertilization	**=**	**€50.00**
Plant protection: 1/4 of a high trellis	**=**	**€250.00**
1 defoliation	**=**	**€45.00**
Total	**=**	**€345.00/ha**

Temporary labor:

- During the growing period, crop maintenance does not require temporary labor.
- The harvest requires an experienced harvester driver to be available as well as one or two tractor drivers (2 in the accepted hypothesis).

Based on the rate of eight hours of harvest time per hectare, this totals 24 hours of temporary employment.

Total	**(24 x €17.50)**	**=**	**€420.00/ha**

Debt repayments:

Determining debt repayments introduces the following problems:

- **Trellising** could benefit from economies of scale on a large scale operation. The estimate for cost per hectare could be around €5,000/ha.
- **The plants:** Twice as many plants are required compared with a traditional hopyard for a cost of **€4,000/ha**.
- **Harvester:** The harvester used was one of a dozen produced and used primarily for the research. Any additional machine would need to be build by the unit. The price of such a machine is around €70,000 (February 2005 price).
- **Equipment for transporting the harvest product to the sorter:** Such a container that is equipped with a moving bottom remains to be created, and its cost could be estimated at €2,500.
- **The branch harvester (Nachpflücker) and the sorter** are items that are separate from a conventional harvester. The cost is 1/3 of a conventional harvester, which is **€45,000**.
- **A belt dryer could be considered,** and the cost would be based on the size of the production unit.

Calculating debt repayment is based on several hypotheses:

- **Prices of specific equipment**
- **The actual size of the production unit**