



BioGreenhouse

Guidelines for Experimental Practice in Organic Greenhouse Horticulture

Edited by Martin Koller, Francis Rayns, Stella Cubison and Ulrich Schmutz



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The Editorial Board This picture was taken at the final meeting to discuss these guidelines, held in Tori, Estonia in September 2015. A commercial organic greenhouse with a tomato crop is shown in the background. Left to Right: Pedro Gomez, Stella Cubison, Wolfgang Palme, Justine Dewitte, Martin Koller, Yüksel Tüzel, Francis Rayns, Ingrid Bender and Ulrich Schmutz.

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Pictures

All pictures are by members of the Biogreenhouse COST Action FA1105. Contributors to the pictures (in alphabetical order) are: Ingrid Bender, Stella Cubison, Justine Dewitte, Pedro Gomez, Martin Koller, Carolyn Mitchell, Jérôme Lambion, Wolfgang Palme, Virginia Pinillos, Ulrich Schmutz, Yüksel Tüzel and Anja Vieweger.

Disclaimer

The information in these guidelines is based on the expert opinions of the various authors. Neither they, nor their employers, can accept any responsibility for loss or damage occurring as a result of following the information contained in these guidelines.

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4.6 Herbs

Many different species of herbs can be grown in greenhouses. Out of them, parsley was chosen as a typical crop to grown in soil and basil as a typical potted herb. They can serve as 'model systems' for other herbs.

4.6.1 Parsley

By Martin Koller and Justine Dewitte

Botanical name: *Petroselinum crispum*

General crop requirements

Parsley is in the Apiaceae family and so is related to celery, carrots, fennel and dill. It is a biennial plant. The leaves tolerate only minimal freezing temperatures but the root is hardy. The first year is the vegetative phase and the second year starts the generative phase. As a herb crop it is grown for only one year.

Two types are grown:

- Curly leaf (*P. crispum crispum* group). This can be divided in sub types, according to their leaves characteristics e.g. Curled (type perlé), Fine curled, Paramount, double/triple curled, frisé vert fonce, "Mooskrause". Unfortunately the names for different types are not used consistently.
- Italian, or flat leaf (*P. crispum neapolitanum* group/ *P. crispum* ssp. *latifolium*).

Plants can grow 30-60 cm tall; the flat leaf parsley grows taller than the curly leaf parsley.

Parsley prefers moist, deep and rich soil. It is sensitive to dry conditions but resistant to cold. There should be a break of at least five years between two parsley crops in the rotation.

The leaves can either be cut mechanically or picked by hand – the sowing density is different in each case.

Darkness is needed for germination so direct sowing has to be done at a depth of 2.5 to 3 cm. If transplanted three to four seeds are sown in each 4cm diameter pressed block. Parsley has a taproot, so the plants have to be planted at the right time because the roots do not have enough space to develop in the blocks.

The crop requires regular watering as it cannot withstand dry periods. A plastic mulch, preferably with preformed holes, can be used.



Figure 4.20 Parsley crop, plants being grown through a plastic mulch.

Experimental design

Recommended replicates: at least 3.

Table 4.57

Typical parsley plant spacing and number of plants required for trials.

	Direct sown (for cutting)	Planted (for picking)
Minimum number of plants/ core plot	2800 - 3200	55 - 135
Minimum size core plot (m ²)	10	5
Plant (or block) density / m ²	280 - 320	11 - 27 multisown peat blocks
Row distance (cm)	10 - 25	25 - 30
Distance between the rows (cm)	2 - 15	15 - 25

Table 4.58

Typical parsley sowing and harvesting dates.

Region - Production type	Sowing at	Planting at	Start of Harvest	End of harvest	Remarks
North & central Winter crop	Mid Jul	Sept	Nov	Apr/May	Unheated or Frost-free greenhouse or polytunnel. In summer parsley is grown in open field only.

Table 4.59

Temperatures required for parsley germination and seedling growth.

Germination temperature °C Day/ Night	Days until germination	Temperature for seedlings in °C Day/ Night	Peat block size	Time from sowing to planting (weeks)
20/ 18 ° Ventilation from 22 - 25	5 - 12	12 - 16/ 10 Ventilation from 20 - 25	4 - 5 cm	4 - 8

Table 4.60

Optimal temperature and critical temperature for parsley crop production

	Day	Night	Ventilation from
Winter crop (optimal)	10 - 15°C	7 - 8°C	18°C
Winter crop (critical)	5 - 6°C *	5 - 6°C	18°C

Table.4.61

Parsley plant nutrient requirements.

Yield expectation (kg/m ²)	N (g/m ²)	P (g/m ²)	K (g/m ²)	Mg (g/m ²)
2	10	1.4	8	1
3.5	17	2.5	14	1.5

Source: adapted from various sources, see Appendix B

Disease and pest infestation, physiological disorders and other abiotic damage

The disease and pest incidence and severity should be scored several times during cropping (see also section 2.5). For the main problems the corresponding EPPO test guidelines are:

- Septoria leaf spot disease - *Septoria petroselini* (PP 1/121 (2) of leaf spots on vegetables).
- Downy mildew - *Plasmopara crustosa* (PP 1/65 (3) Downy mildews of lettuce and other vegetables).
- Powdery mildew (PP 1/57(3) Powdery mildew of cucurbits and other vegetables).
- Aphids (PP 1/24(2) Aphids on potato, sugar beet, pea, broad bean and other vegetables). Yellow dwarf virus is spread by aphids.

Other emerging diseases and pests (such as virus diseases, bacterial leaf spots, sclerotinia, aphids, carrot fly, parsley weevil) should be mentioned in the trial report or recorded individually if different infestations in the treatments occur.

Assessments during crop growth

- For direct sown crops - the number of days between sowing and germination (the date by which approximately 50% of the plants have germinated).
- Crop establishment (1 = absent or very weak, 3 = low, 5 = moderate, 7 = strongly, 9 = very strong).
- Stand density - about 4 weeks after emergence, the plant number in a 1m length of row is counted in a typical area of the plot.
- Colour (1 = pale green, 3 = light green, 5 = medium green, 7 = dark green, 9 = very dark green)
- Curliness of leaves (1 = absent or very weak, 3 = low, 5 = moderate, 7 = strongly, 9 = very strong)
- Yellowing of lower (older) leaves (1 = absent or very weak, 3 = low, 5 = moderate, 7 = strongly, 9 = very strong)
- Canopy height – the crop height is measured at 5 locations per plot.
- Missing plants - gaps of more than 25 cm in length shall be measured.

Assessments at harvest

Harvesting is done three times by hand or power mower (e.g. baby leaf harvester) approximately 5 cm above the soil. Each treatment is harvested when both yield and quality reach an optimum (e.g. begin for curly types when canopy height is greater than 20 cm, begin for flat leaf types when the canopy is greater than 40 cm or the lower leaves are turning yellow). The total harvest of the core plot should be weighed and the proportion of non-marketable crop determined (rejecting, for example, yellowed, red and diseased leaves). The leaf / stem ratio is determined by sorting and weighing a sub sample of 1000g of the crop.

Parsley may be grown for processing as dry produce. To assess this samples of each plot should be dried gently at 40 -45 ° C (for about 18 hrs.). The foliage is then weighed. In some experiments it is desirable to determine the quantity of essential oil in the foliage (% v/m).

Overall value score

This takes into account all criteria of the variety, based by on expert opinion as evaluated by researchers using information from farmers, wholesalers and consumers (1 = very low, 3 = low, 5 = medium, 7 = high, 9 = very high).

References and Further information.

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