



**General Guidelines
for the use of Klasmann substrates**







Klasmann substrates based on oligotrophic peat from raised peat bogs are high quality products ensuring optimal plant growth. To receive optimal performance from the product it is recommended to consider the following hints when using substrate in the nursery.

I. Loosening up and mixing of compressed substrates

Substrates in compressed bales (either 200 L or Big Bales) require some gentle loosening up before use. It is not necessary to mix the substrates any further as it is already a homogeneous, ready to use mix.

A small amount of water should be added to ensure optimal moisture for potting/tray filling.

Before use the following should be checked:

1. For transplanting a humidity level of 60–65 vol.-% is ideal. This allows best handling while potting/tray filling, it avoids a transplanting “shock” and it is easy to rewet.
2. Put some substrate in your hand. If you are able to blow it away easily, it is too dry.
3. 8 L of water per 200 L bale is usually sufficient to bring back the moisture to an optimal level.
4. Optimal moisture is given if you are not able to press out water by hand, but you can hear squishy sounds when pressing the substrate in your hand close to your ear. The humidity level is then optimal. The substrate should keep its shape after being compressed by hand.

a) Substrate too dry – loses shape after pressing.



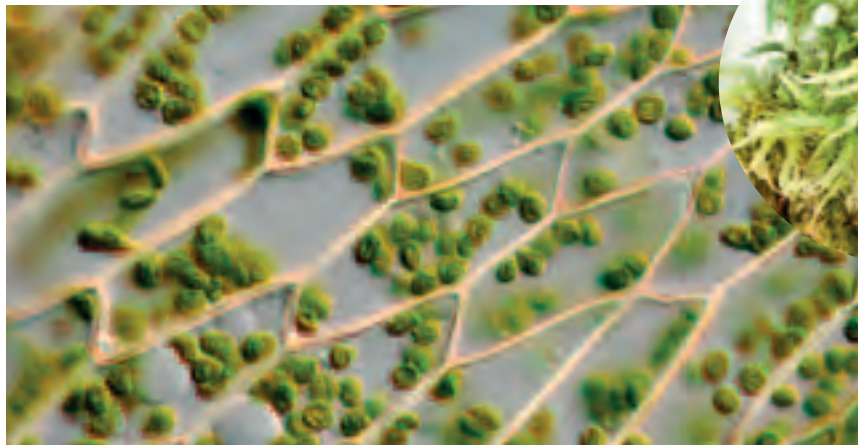
b) optimal moisture – substrate keeps its shape.



c) squishy sound but no water droplets when pressed.



Micro-structure of peat moss species.
(*Sphagnum papillosum*)



The physical properties of peat moss are based on the pore-structure of the Sphagnum plant. The cells in peat substrates are still mechanically active in regard to water and air uptake. Any step in the production process from harvesting until final use in the nursery, needs to ensure, that the micro-structure of the sphagnum leaves stays as unaffected as possible. This will conserve the beneficial mode of action of peat for the crop and provide high quality product.

Loosening up therefore need to be done carefully in order to preserve the structure of the substrate. This is particularly important for coarser structures where excessive loosening up/mixing will break down the sod peat fractions into finer structures. Aggressive mixing facilities (such as the mill below) will destroy the structure of the product.

Loosening up of compressed peat substrates can be done by hand or by suitable machines.



By hand: It is recommended to use a shovel.



By machine (specific substrate mixers):
Mixing time should be restricted to a minimum in order to maintain the structure of the product.




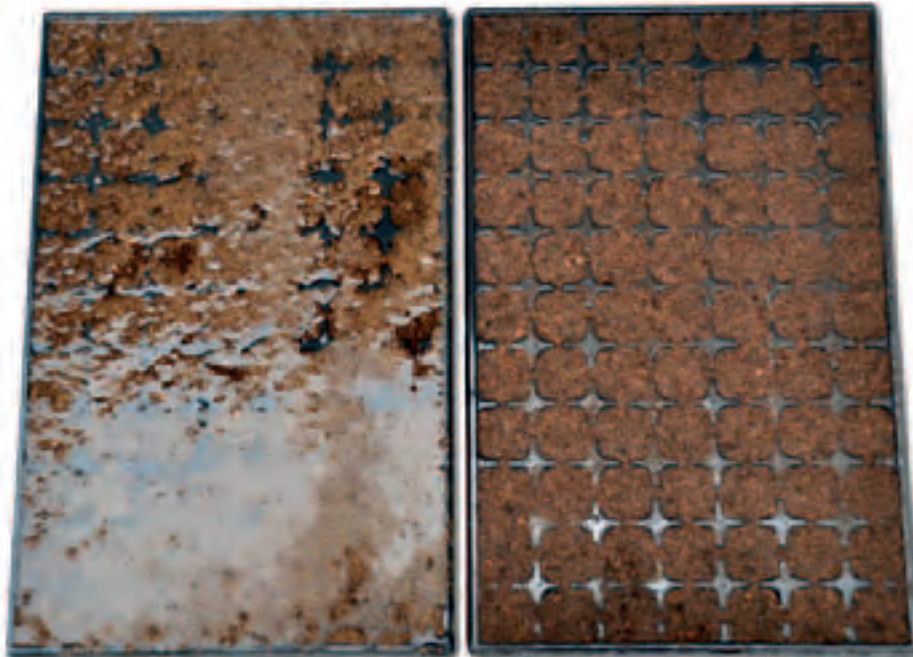
Products in Big Bales can be loosened up by hand (shovel) or wheel loader. Also specific dosage bunker machines can be used to obtain sufficient and efficient loosening up of the substrate.

Adding controlled release fertiliser or other specific additives may be combined when mixing/loosening up the substrate.


If additional additives need to be mixed into substrates, these additives should be thoroughly mixed using a shovel or a suitable substrate mixer.

Controlled release fertiliser can also be added automatically in the potting line with a direct dosage system.

Klamann **hydro** , a specific and highly active wetting agent, is included in Klamann substrates. This additive will ensure optimal initial re-wetting and also re-wetting during cultivation.

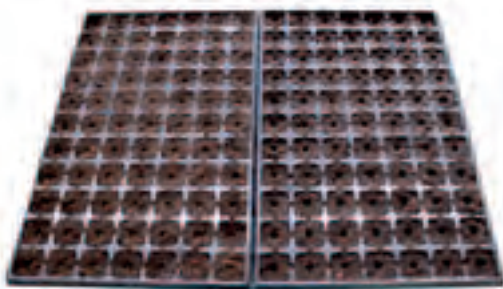


a) Substrate without efficient wetting agent – water droplets stay on substrate surface.

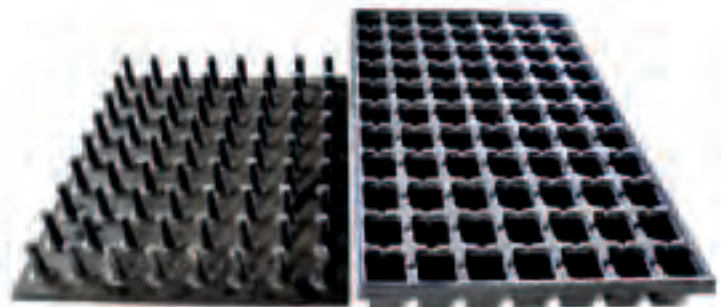
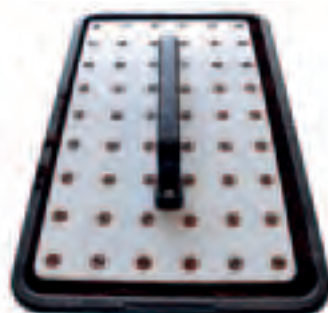
b) Substrate with **hydro** . Wetting agent – water is taken up by substrate immediately.

II. Filling and sowing of cell trays

1. Trays should be filled evenly with the same amount of substrate in each cell and with the same compaction. This will ensure similar water holding capacities in each cell and reduce problems with inhomogeneous water levels within a tray during crop cultivation.
2. After filling the trays by hand, it is recommended to tap the trays 2 to 3 times on the ground or on a table to ensure slight compaction of substrate. This will show if all cells are filled evenly. Cells with too little substrate can be filled up afterwards.
3. Using a simple dibbling board can support the tray filling process, but each cell needs to be filled with the same amount of substrate before compaction. If cells are not filled evenly, it can create an inhomogeneous compaction within the tray.
4. An automatic sowing line can also be used to ensure high homogeneity during tray filling. To measure the weight of the trays is a methode to have uniform physical properties of the substrate in the tray.
5. After filling and dibbling, sowing can take place into the substrate.
6. Irrigation should be given as a final step to ensure a good contact between the seed corn and the substrate surface.
7. Some seeds might require Perlite or Vermiculite as a top layer. This should be applied prior to final irrigation.

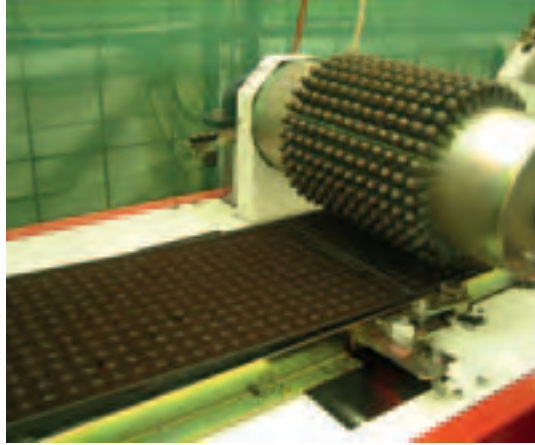


Examples of filled and dibbled trays ready for sowing and for possible dibbling boards.





a) filling of trays.



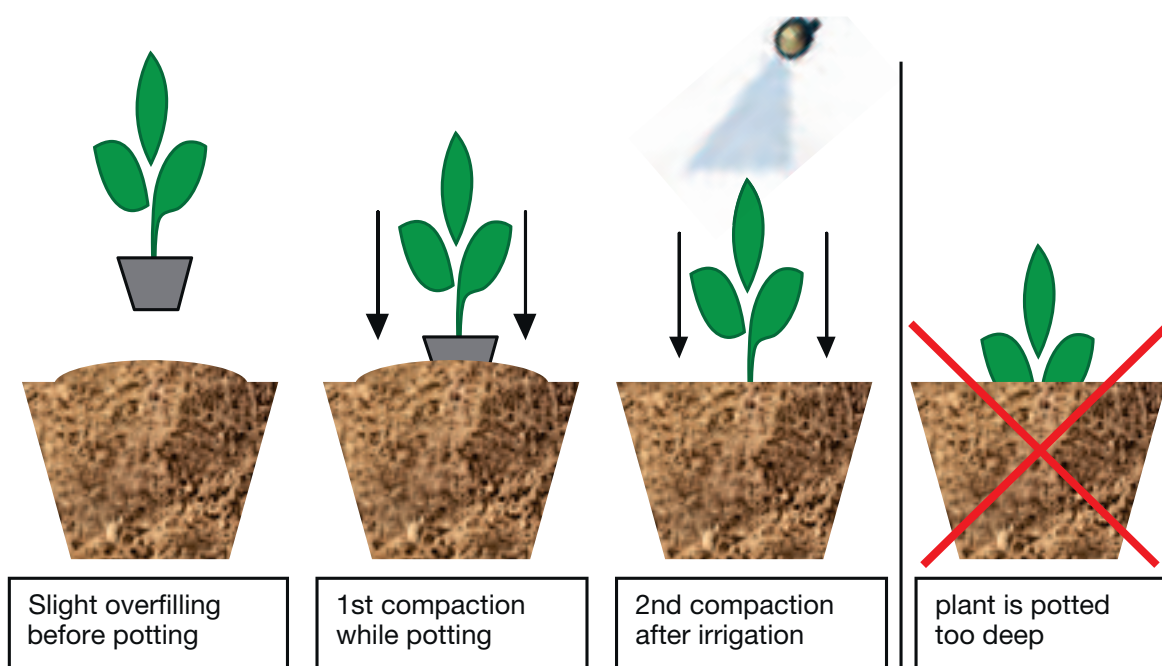
b) compaction and dibbling.



c) automatic sowing.

III. Filling of pots and transplanting

- Pots should be filled up to the top with slight overfilling. Transplanting afterwards and initial irrigation will result in some compaction of the substrate due to its open structure. Never press the substrate strongly into the pots.
- Young plants should not be potted too deep into the substrate as they may sink slightly into the substrate during the first days after transplanting due to compaction. Plants might suffer from air and light deficiency around the stem area.
- After transplanting the crop should be irrigated carefully to allow the substrate to reach a good compaction and ensure contact with the plant roots.



Correct transplanting of rooted young plants into pots.

IV. Irrigation – Important steps to consider

1. Consider the water capacity

- a. An important advantage of peat based substrates is, that its water holding capacity is significantly higher than other growing media (bark, coir, rice husks, etc.). The irrigation regime in the nursery needs to be modified to receive optimal benefits out of the product.
- b. If the irrigation regime for peat substrates is the same as for other growing media it is very likely that the peat substrate will receive too much water which can have a negative effect on plant growth.
- c. In general, peat substrates will require less irrigation and less fertilisation than other growing media. The raised bog peat has higher water retention and therefore longer intervals between irrigation will be required.
- d. With less irrigation, there may also be less leaching of nutrients. Therefore it is likely that the requirement for fertiliser applications may also be less frequent than with other growing media.

Dark brown/black colour and free water on surface indicate a substrate that is too wet. The plants will suffer from air deficiency within root system.



Results: Root growth is not sufficient; peat will lose structure and its beneficial properties.

Liverwort and algae start to develop on wet substrates; plants suffer from stress which results in higher pressure from pests and diseases (Pythium, Phytophthora, Fusarium, Sciarid flies, etc.).

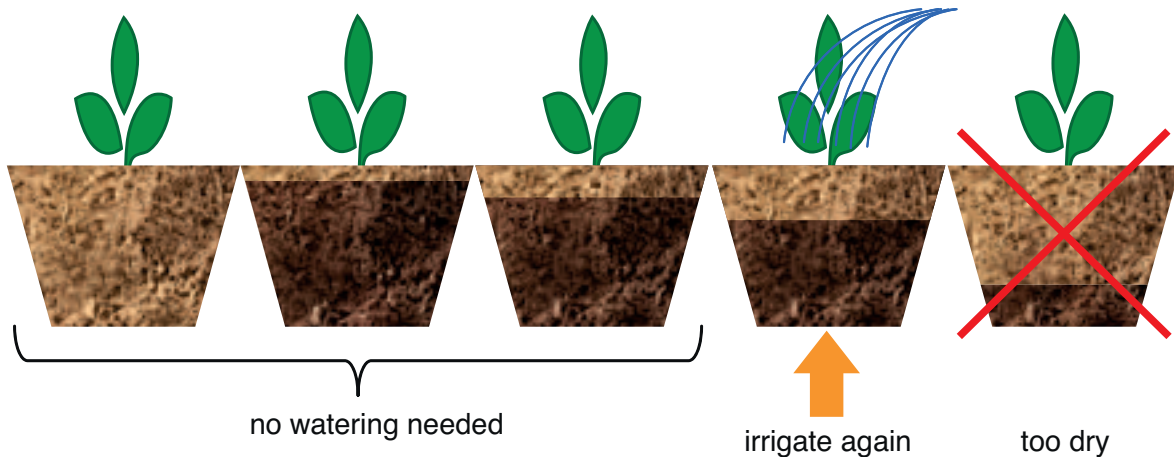


Example of strong liverwort growth under very wet conditions.



2. Prior to irrigation:

- a. Check the moisture level of the substrate. Is irrigation required? The substrate colour is an indicator.
- b. Check the moisture level not only at the surface, but also at the bottom of the pots/trays.
- c. Check the weight of pots/trays. Even if the substrate seems to be light and dry on top, the overall moisture level might still be sufficient for optimal plant growth.



Visual judgement of correct time of irrigation based on colour of the substrate.

3. The irrigation process

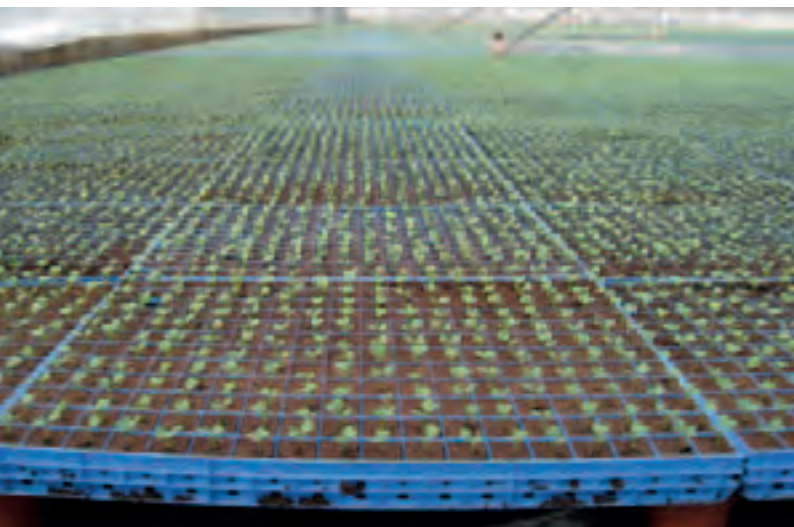
- a. Irrigation should be done with reduced water pressure to ensure the substrate is not washed out of the pots or parts of the plants are broken. Irrigating with too much pressure can also cause compaction of the top layer. This will result in stronger growth of algae, and development of a “crust” which will cause problems for re-wetting of the substrate and aeration of plant roots.
- b. Excessive water should not be given, to avoid waterlogged situations in the substrate. This might increase problems with diseases for the crop.
- c. A more dry cultivation of the crop and ensuring a dry substrate surface generally reduces the risk of algae growth. Plant growth is healthier, as plant stress and pressure from pests and disease is less.
- d. The initial irrigation of peat substrates after transplanting should be carried out very accurately to ensure the whole substrate receives water homogeneously. This avoids inhomogeneous drying out within a tray or between pots during the cultivation process.
- e. In particular, the rims of a crop need to be irrigated sufficiently. This will avoid the “rim effect” (drying out effect by wind and temperature difference, which is strongest at the rims of a crop) and ensure more homogenous water availability in the crop.



4. General “rules” for irrigation

- a. Irrigation should be carried out during the morning to allow the substrate and plant leaves to dry up during the day.
- b. The leaves should turn “dry” over night to reduce pressure from pests and diseases.
- c. Never give water during strong sun light around midday. This can cause leaf burning.
- d. Some crops are sensitive to cold water (e. g. *Saintpaulia ionantha*). Irrigation water should not differ by more than 5–10 °C compared to the air temperature for these crops. Storage of irrigation water inside the greenhouse is recommended.
- e. Make sure that the substrate is completely wet without excess water. No dry zones should be left in the pot. The substrate should only be irrigated again after it has dried out and visual judgement based on the colour of the substrate or moisture monitoring indicate irrigation is required.

5. Possible measures to ensure drainage and avoid water logged situations



Cabbage young plants after germination. Trays positioned on pots to ensure free draining.

Pots turned upside down under each tray.

V. Recommendations for storage of peat substrates

Peat substrates are natural products based on 98 % organic matter and enriched with microbial activity. To ensure optimal substrate quality even after a certain storage time, avoid the negative effects of sun, temperature and rain. It is recommended to consider the following hints for storage:

1. Never stock in direct sunlight.
2. Protect pallets with black nets against sunlight (UV stable).
3. If possible, stock inside (no sun, no rain).
4. It is advisable to store substrates below 25 °C.
5. Follow strictly “Fi-Fo” = First in, first out!
6. Propagation substrates should be used “as fresh as possible”.
7. In general, try not to stock substrates for more than 3 months in the nursery.
8. In the case of overstocking, a chemical analysis, Chinese cabbage test (laboratory control) or a small growth test in the nursery is recommended before use to determine if the product can be used without problems.



Incorrect and unprotected storage outside.



Optimal storage of Klasmann Substrates in a protected location.



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All application and usage recommendations must be understood as non-binding guidelines and must be adjusted to meet local circumstances and code of practice.

Store product in a cool place, protected from direct sunlight and precipitation, otherwise guarantee is rescinded.

Any liability for the presence of saprophytic organisms and related effects, e. g. development of mycelium, cannot be accepted.

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