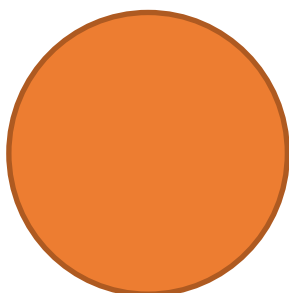
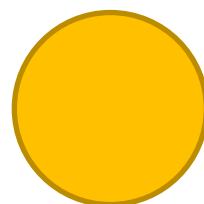
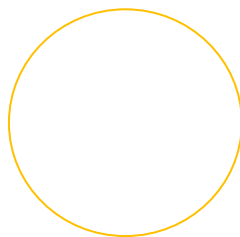


Projekt MinimalSpild

Nyhedsbrev nr. 6

Februar 2017



Indhold

Der blev den 31.01.2017 holdt styregruppemøde, hvor vi gjorde status på projekt MinimalSpild.

Sæt allerede nu kryds i kalenderen

- d. 29. marts 2017 kl. 12:00-15:30 til Partnerskabsmøde (sted tilgår)

- d. 23. november 2017 kl. 10:00 – 16:00 Afsluttende konference (Hvidkærvej 29, 5250 Od SV)

I dette nyhedsbrev har vi fulgt op på de seneste forsøg, samt lige en reminder om timeregistreringen, som I nu kan få assistance til at udfylde!

Forsøg og resultater

Siden sidst er der lavet en masse nye forsøg hvilket har givet spændende, som vi gerne vil dele med jer. Der er bl.a. lavet forsøg med pakning af potteplanter samt hvordan mikroklimaet påvirker potteplanter.

- Merete og Alexandru har skrevet en artikel om pakning af potteplanter
[Læs mere på side: 3-5](#)
- Karen og Alexandru skrevet en artikel om hvordan mikroklimaet påvirker potteplanter.
[Læs mere på side: 6-8](#)

Timeregistrering

Vi mangler at modtage timeregistrering fra enkelte partnere, og skal derfor bede om at disse bliver sendt til ms@floradania.dk hurtigst muligt. Har man brug for assistance med udfyldelsen af skemaerne til timeregistrering, kan der tages kontakt til mig enten pr. telefon 65926266 eller pr. mail ms@floradania.dk, så vil jeg komme og hjælpe med at få det udfyldt.

Input til nyhedsbrev

Skulle i ligge inde med nogle spændende resultater eller andet i forbindelse med projekt MinimalSpild, er I velkommen til at sende det til ms@floradania.dk.

På styregruppens vegne

Maria Sørensen



Pakning af potteplanter

Af: Alexandru Luca og Merete Edelenbos

Potteplanter tørre nemt ud, når de har forladt gartneriet. Vores nyeste resultater i MinimalSpild viser at **vi kan reducere vægttabet i miniroser med den rigtige pakkelse. Vel og mærke uden at gå på kompromis med kvaliteten.**

Forsøg med pakning af potteplanter

Single plants were packaged using different methods (Figure 1):

1. No packaging material (uimballeret)
2. Sleeve (pottesvøb)
3. Full plant closed package (fuldpakning)

For each package method, 3 different film materials were used (Table 1).

All plants were stored for 4 days at 16 °C and 68% RH in darkness. After storage, plants were weighed (Figure 2) and moved to the keeping quality room at Aarhus University and stored for 17 days. On day 11, packaging film was removed and plants were watered. The quality of plants was evaluated at day 17 (Figure 3).



Figure 1 Mini roses in sleeve and closed package

Tabel 1. De anvendte pakkematerialer

Materiale	Beskrivelse
PM1	Bionedbrydeligt materiale. Stivelsesbaseret med en mellem vandtransmission.
PM2	Oliebaseret materiale med en lav vandtransmission.
PM3	Komposterbart materiale. Cellulosebaseret med en høj vandtransmission.

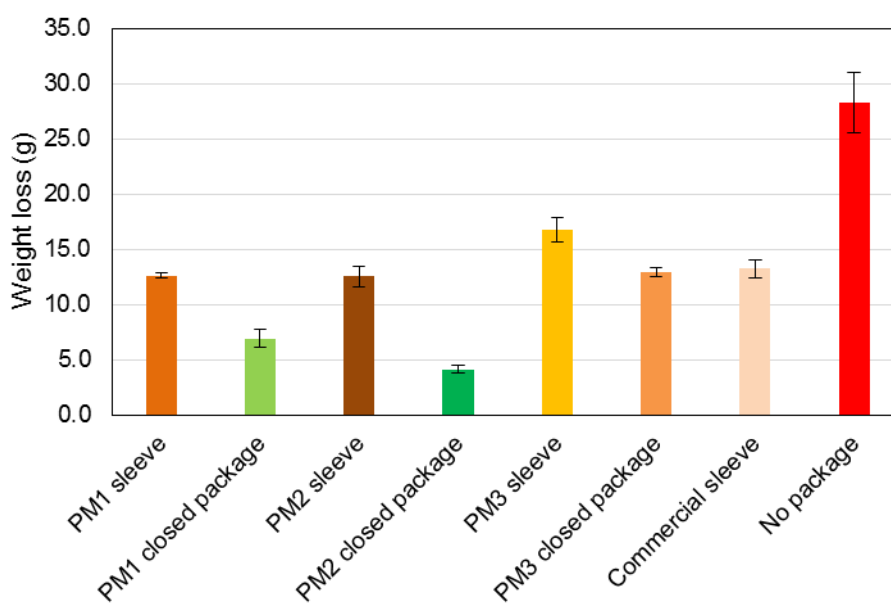
Pakning reducerer vægttabet

After 4 days of storage at 16 °C and 68% RH in darkness there were big differences between the weight losses of the plants (Figure 2). The control plants (no package), lost 28 g or around 20-30% of the original weight during 4 days storage at 16 °C and 68% RH. Overall plants lost more weight and thus more water packaged in sleeves than in full plant closed packages.

Pakkematerialer er forskellige

There were differences in the weight loss between the different packaging materials. Plants packaged in the PM3 material lost more weight than those packaged in the PM1 and PM2 materials due to higher water vapor transmission rate of the PM3 material. Plants packaged in the PM1 and PM2 sleeves lost almost the same weight as those packaged in the commercial sleeve. Use of sleeves reduced the weight loss by more than 50% compared to unpackaged plants.

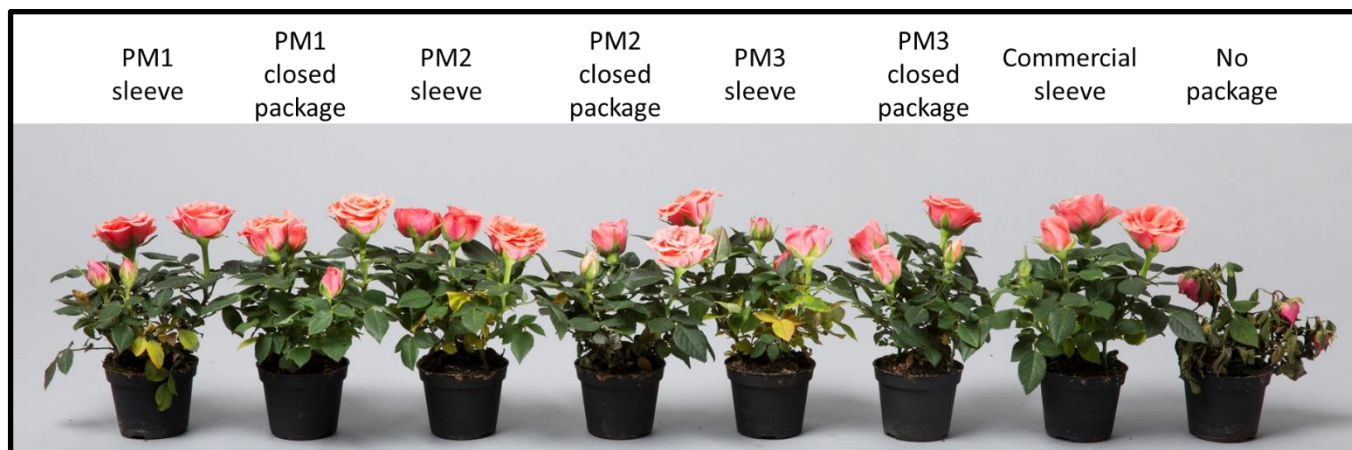
Plants packaged in the PM1 and PM2 material using the closed packages had the lowest weight loss. Compared to commercial sleeves, the closed PM1 and PM2 packages lost less than half the weight during 4 days of storage at 16 °C and 68% RH. This clearly illustrates that it is possible to control weight loss and thus drying out of potted plants in the supply chain by use of appropriate packaging materials and solutions.



Figur 2. Vægttab i miniroser efter 4 dages opbevaring ved 16 °C og 68% RH.

Lavt vægttab er ikke nødvendigvis lig med høj kvalitet

The use of different packaging solutions also influenced the quality of the plants (Figure 3). Unpackaged plants wilted on day 8 and did not recover even though they were watered on day 11. Plants stored in the PM3 sleeve also wilted. This was observed on day 11 just before they were watered and this wilting negatively affected the quality. The plants stored in the closed PM2 package had the lowest weight loss but these plants had grey mold on stems at day 17. The quality of all the other plants was acceptable and plants had less than 20% wilted flowers and buds and few yellow leaves on day 17 (Figure 3).



Figur 3. Plantekvalitet efter 17 dages opbevaring. Planterne blev opbevaret 4 dage uden indpakning (no package), i pottesvøb (sleeve) eller i lukkede pakker (closed package). Pakkematerialerne PM1 til PM3 er beskrevet i tabel 1.

Er der en fremtid for fuldpakning af pottedplanter?

Ja, men metoden skal udvikles og bruges med omhu. Resultaterne viser at fuldpakning kan beskytte planter imod udtørring, så de holder længere uden vand. Dette kan blive en vigtig fremtidig konkurrenceparameter for den danske prydblantebbranche.

Resultaterne viser også at fuldpakning skal bruges med omhu, fordi planterne har forskellige tolerancer overfor fx fugt. Derfor er det vigtigt, at plante og pakkemateriale passer sammen.

Hvordan mikroklimaet påvirker potteplanter: simulering af forskellige lager-, transport- og butikssituationer

Alexandru Luca, Karen Koefoed Petersen

Temperature and relative humidity (RH) are important microclimate parameters often determining the final quality of potted plants. Temperature has a direct effect on the rate at which physiological processes and microbial growth take place. Therefore, the higher the temperature the higher is the rate of physiological processes (e.g. senescence) and the faster is growth of microorganisms.

Betydningen af RH

If the RH of the environment is low the plants will lose water at high rate and thus will wilt in a short time. However, if RH is too high (>95%) plants can be attacked by microorganisms whose growth is promoted at high RH. Some challenges with low RH can be solved by implementing watering into the potted plant chain but in some cases this can be hard to do e.g. when plants are stored in the distribution centers or transported for a long period of time.

We have carried out experiments at Årslev to determine how different simulated conditions representing real conditions in the Danish potted plant chain and implementation of watering into potted plant chain affect the quality of selected potted plants.

Mini campanula and mini roses were selected for the experiment. After sorting, plants were stored in darkness for 4 days at 5 different conditions each representing storage conditions in the Danish potted plant chain:

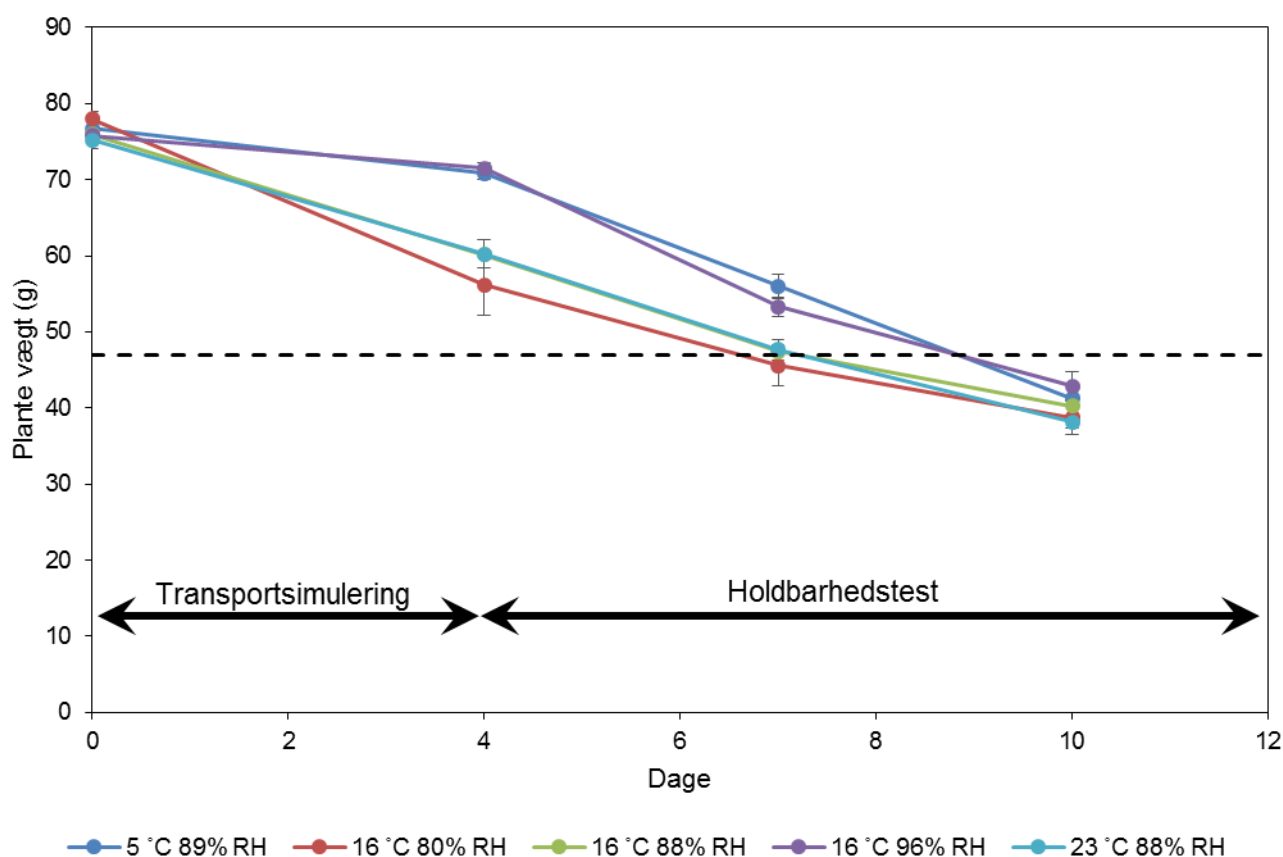
1. 5 °C & 89% RH (Kølelager hos producenterne)
2. 16 °C & 80% RH (Tæt på forholdene hos eksportørerne)
3. 16 °C & 88% RH (Forholdene under en blandet transport)
4. 16 °C & 96% RH (RH ved ikke-optimal indpakning)
5. 23 °C & 88% RH (Detailleddet)

After 4 days of storage all plants were moved to a keeping quality room and kept at ambient conditions (close to the conditions in the retail (indoor)) where they were stored until day 17. Half of the plants were regularly irrigated while another half was irrigated for the first time 11 d after the start of the experiment.

Klimaet påvirker hastigheden hvormed planterne tørrer ud og er derfor en vigtig faktor for hvornår planterne visner

Storage conditions affect the rate at which plants lose water and thus determine the time at which plants will wilt (Figure 1). Mini campanulas stored at 5 °C & 89% RH and 16 °C & 96% RH lost less water during first 4 days of storage when compared to plants stored at other conditions. When plants were moved to the keeping quality room they were subjected to the same storage conditions and thus lost the weight at almost same rate. However, they wilted at different time. Plants stored from day 0 to day 4 at 16 °C & 80% RH, 16 °C & 88% RH and 23 °C & 88% RH started to wilt on day 7, while plants stored at 5 °C & 89% RH and 16 °C & 96% RH started to wilt after 9 days. The difference in 2 days is thus directly related to the conditions at which plants were stored during first 4 days.

Lav temperatur eller høj luftfugtighed forlængede tiden til begyndende visning fra 7 til 9 dage i mini *Campanula* under skånsomme holdbarhedsforhold



Figur 2 Vægt af mini *Campanula* over tid efter 4 dages transportsimulering ved forskellige forhold efterfulgt af 6 dage i holdbarhedstest uden vanding. Den stiplede linje viser vægtgrænsen for begyndende visning.

Vanding undervejs i transportkæden og i detailledet kan sikre forbrugeren en bedre oplevelse med potteplanter, men transport og opbevaring ved lav temperatur kan også forlænge kvaliteten

Implementation of watering in the transport chain for potted plant chain and varying storage conditions influence the final quality of plants (Figure 2 and Figure 3). In majority of cases, the final quality of the plant is dependent on storage temperature, RH of air in the environment and watering. For example, leaf yellowing or browning of campanula and roses stored at 16 or 23 °C can be reduced if plants are watered regularly. However, the same does not apply for some plants stored at 5 °C. Wilting of campanula flowers and wilting of rose flowers and buds can be reduced if these plants are stored at 5 °C for 4 days and are regularly watered (especially in case of campanula).

Høj temperatur og høj luftfugtighed i transportkæden medfører risiko for udvikling af gråskimmel i *Campanula* og roser. Roserne udviklede desuden mere gråskimmel når de ikke blev vandet optimalt.

On day 4 grey mold was found in the flowers of mini campanula stored at 16 °C & 96% RH and 23 °C & 88% RH. However, it was not detected at the later period of storage indicating that high RH and high temperature can result in grey mold attack of campanula flowers. In case of roses, incidence of grey mold attacks was related to the watering. Grey mold was detected on day 17 in the plants stored for 4 days at 16 °C & 80% RH, 16 °C & 88% RH, 16 °C & 96% RH and 23 °C & 88% RH which were watered after 11 days. In case of roses watered regularly, grey mold was detected on day 17 only in plants stored at 23 °C & 88% RH.