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101 Ways to Try to Grow Arabidopsis: Can I Leave Plants Sitting in Water?

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Purdue Methods:

Can I leave plants sitting in water?

Short answer:
No. Drain trays whenever possible. If water has to be left in trays, add calcined clay granules to soil mix. Or use as tall a soil column as possible—not a flat, open tray of soil.

Results:
Many researchers leave their plants sitting in trays of water to minimize need for watering, or because they believe the plants require a saturated root medium. In our study using varying sizes of pots left in 1.5-2.5 cm of standing water, plants fared poorly compared to those where the tray was drained following irrigation. Left standing in fertilizer solution, plants were chlorotic and stunted; in clear water, plants were purple and stress-related flowering induced.

The taller the soil column, the less symptoms produced. Symptoms were hardly visible in 4-inch pots.

Augmenting a commercial soilless media with calcined clay granules (0.2-0.5 cm diameter) improved plants growing in constant sub-irrigation, across all brands of soilless mix.

Discussion:
It usually takes less than 5 minutes of sub-irrigation for most containers to absorb their full capacity of water. One report noted that water needs of the plant greatly increase during silique filling (1), but it is still our recommendation that trays should be drained a few minutes following irrigation even if watering frequency is increased during this period.

Plants left sitting in trays of water grow poorly, with symptoms varying according to solution used. Keeping plants sitting in trays of water can lead to a suitable environment for pests such as fungus gnat and shore fly. Accumulation of fertilizer salts is also possible.

It is our recommendation that researchers who cannot manage irrigation needs of plants over weekends or holidays keep water in trays, but augment soil mix 1:1 with calcined clay granules. This may also be useful in 24-hour photoperiods, when plants might suffer water stress due to high evapo-transpiration rate under this constant light.

A taller pot—even if it contains the same volume of soil mix as a shorter, flatter pot--holds less water. A classic demonstration of this is to saturate a rectangular kitchen sponge while holding it out flat and allowing any excess water to drip out. When it has all dripped out, tip the sponge

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upright on its end without squeezing it. More water drips out! It holds less water when upright even though nothing else about the sponge has changed. Some open cell inserts such as “601 cell packs” or the much-dreaded “201 half-trays” are similar to these sponges laying flat.

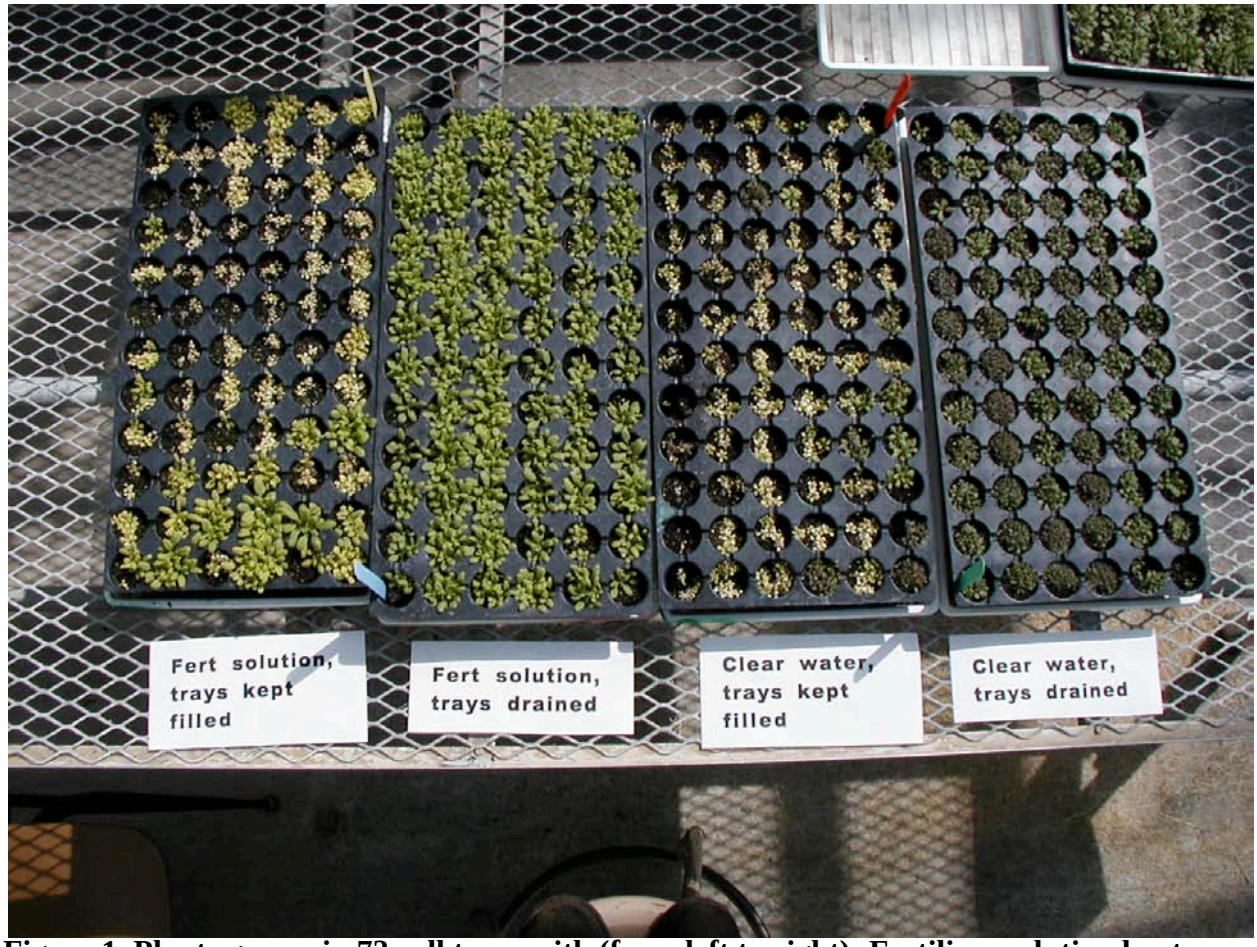

Figure 1. Plants grown in 72-cell trays with (from left to right): Fertilizer solution kept constantly in tray; Fertilizer solution drained following each irrigation; Clear water kept constantly in tray; Clear water drained following each irrigation. Note chlorosis and plant death with trays not drained.

Figure 2. Plants grown in 201 trays with (left) fertilizer solution kept constantly in tray and fertilizer solution drained following each irrigation.

Figure 3. Plants at maturity grown in four pot sizes with fertilizer solution kept constantly in tray (top) versus same pot sizes when trays were drained following each irrigation.

Figure 4. Plants growing in 3-inch pots in trays kept constantly in fertilizer solution. From bottom: Redi-earth; Redi-earth and Profile calcined clay at 3:1 by volume; Redi-earth and Turface calcined clay at 3:1 by volume: Redi-earth and Turface calcined clay at 1:1 by volume. Note reduced chlorosis of the top row.