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Finish more leafy crops by using nursery channels or rafts

Increasing the output of a facility increases revenue. By using space more efficiently during the early part of the cropping cycle for leafy crops, you can create more space for finishing.

How many of you could use more space in order to produce and sell more product? Undertaking a greenhouse expansion is not trivial and is a significant capital investment. Instead of expanding the growing space, lettuce, leafy green, and culinary herb producers can look to altering their planting schedule and space allocation for crops. This article is going to cover how to use nursery channels and rafts in nutrient-film technique (NFT) and deep-water culture (DWC) hydroponic systems, respectively.

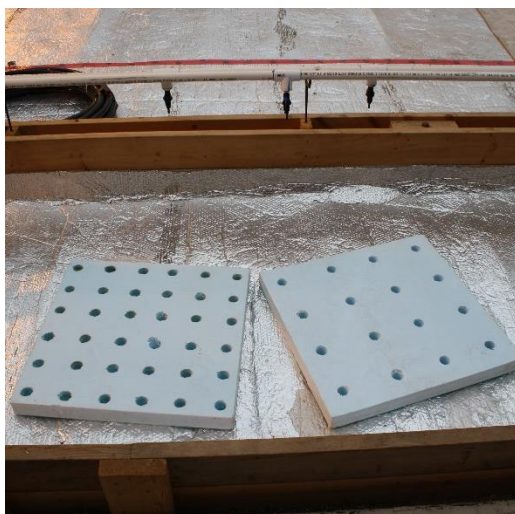


Figure 1. Nursery rafts (for deep-water culture) or channels (for nutrient-film technique) conserve space at the beginning of a crop production cycle, freeing up more space to produce more finished plants.

In a traditional production plan for leafy greens and culinary herbs, there are typically two phases in production: 1) propagation/transplant production; and 2) finishing. In these two phases there are also typically two different planting densities or spacings: 1) the high-density, close spacing used during propagation; and 2) a low-density, moderate spacing used during finishing. However, when seedlings are first transplanted into systems for finishing, they do not require all the space they are allotted at their initial planting. Nursery channels (for NFT systems) or rafts (for DWC systems) are areas with a greater planting density than the final plant spacing (Fig. 1).

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Figure 2. Butterhead lettuce is commonly grown on 8-inch centers. However, this amount of space is not necessary during the early part of the production phase.

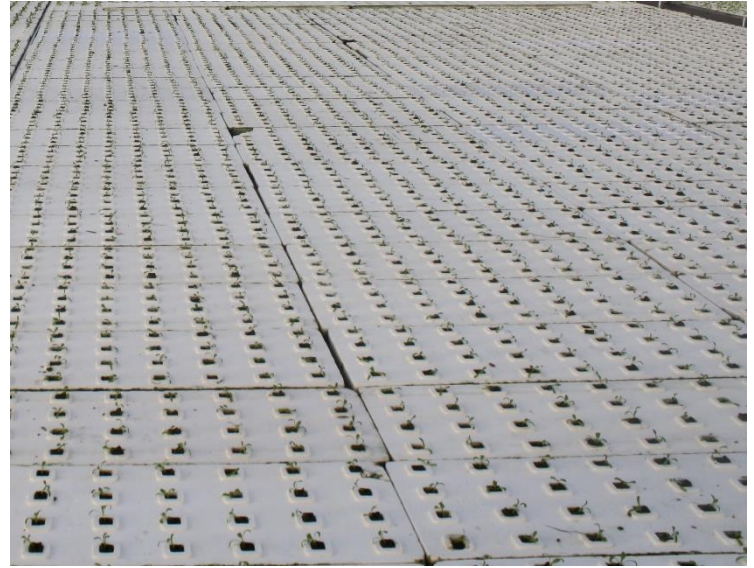


Figure 3. Even when close nursery spacings are used, there is sufficient space for crop growth and development to proceed unencumbered. In fact, the closer spacing may justify use of additional inputs such as supplemental light to enhance growth as a result of the reduced cost on a per-plant basis.

For example, while a common final spacing is 8 inches on center, whether within and between NFT channels or on DWC rafts, spacing in a nursery would be 4 inches (or some other spacing closer than the final spacing). Using nurseries is a more dynamic use of growing space, providing plants with less growing area when it is not utilized and more when it can be.

Benefits of nurseries

The primary benefit to using nursery channels is improving space use efficiency in production systems. By growing plants in nurseries after propagation, but before plants are placed into their final spacing, the space required to produce the crop is reduced. Let's look at an example using butterhead lettuce.

We will start by looking at the space requirement for a five-week butterhead lettuce crop. First, let's calculate space use for lettuce transplanted into hydroponic systems on 8-inch centers for the entire five weeks (Fig. 2). For the purposes of this example and space use, it doesn't matter what the hydroponic system is- NFT or DWC- but the plant spacing is important. Plants will be using 64 in² or 0.44 ft² during each of the five weeks for a total of 2.22 ft² for each plant over the entire production cycle. Now, let's use the same example, but look at how space use is reduced through the use of a nursery channel. Taking the same butterhead lettuce seedlings, except transplant them into nurseries on 4-inch centers for two weeks (Fig. 3), then transplant them onto 8-inch centers for the last three weeks of production. With plants now using 16 in² (0.11 ft²) for each of the first two weeks, followed by three weeks at 64 in² (0.44 ft²) per for a total of 1.56 ft² required for the entire production cycle- a 30% savings in space.

The results are the same even when the growing environment is conducive to growth and growing schedules are faster or slower. If we look at a 4-week lettuce crop grown on 8-inch centers for the entire four weeks (1.78 ft²), there is a 38% reduction in the total

space requirement when a 4-inch nursery spacing is used for the first two weeks followed by two weeks finishing at 8 inches (1.12 ft² total). Alternatively, 25% (0.67 ft²) is saved for a 6-week crop when the first two weeks are in nursery channels.

Regardless of what the production scenario, using nursery spacing reduces space requirements. This efficient use of space ultimately expands production capacity by freeing up more space in the production area for finishing more plants using the space savings.

Drawbacks of nurseries

The space savings using nurseries is a clear benefit. However, there are two drawbacks when using nursery channels in NFT and DFT systems. The first is the labor involved in transplanting plants from nursery channels or boards into their spacing for finishing. Since plants are transplanted by hand, this adds an extra “touch” for each plant and therefore, increases labor costs. Estimating the labor costs associated with using nursery channels or boards can be difficult, since it varies widely between facilities, production systems, and individuals. Regardless, the time involved in transplanting is going to be adding to production costs.

The second drawback, and a hopefully lesser one, is the potential for damaging root systems. When plants are removed from nursery channels or boards, then transplanted into their finished systems, there is potential for damaging root systems. This damage can occur after root systems have developed in nurseries then need to be removed and placed into other systems. This root damage can also be exacerbated when employees are trying to transplant plants from nurseries into final spacing quickly, and lack of attention can lead to damaged plants. Damaged roots can temporarily slow growth and increase susceptibility to pathogens.

Take-home message

If space is tight and you are looking for ways to improve your productivity with expanding your footprint, consider using nursery spacing in your NFT and DWC systems. Even with the additional labor costs associated with an extra transplanting, nurseries can pay off with the capacity added to facilities.



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