

Devine, E. S.: Six principles dictate choice of a crop handling system. *The Grower*. 84(12):493-495.

When assessing benefits of a handling system, the following points need to be considered: 1) General labor reduction and removal of peaks. 2) Can labor be used more efficiently. 3) Re-deployment of labor. And 4), reduction in damage. Both ownership and operational costs are included. The speed of obsolescence and rapid new developments must be considered.

Most handling associated with greenhouse crops occurs during the harvesting-market preparation cycle, and the table gives some indication of the percentage time spent per acre for leading crops.

Percentage of time spent per acre for handling

Crop	Ratio	Percentage handling
Tomatoes	3:1	20
Lettuce	2:1	15
Cucumbers	2.5:1	20
Carnations	5:3	25
Ayr Chrysanthemums (spray)	2:1	25

When financial cost of harvesting is calculated, this is the figure that must support a handling system. No present day system can operate without some manual labor, which places a severe restriction on expenditure

for mechanization. Not more than half of the estimated figure should be set against the annual payment for handling equipment. It immediately brings up the question of market integration.

Movement of spray mums from bench may be by trolleys on concrete, carriers that straddle the growing area, or more sophisticated systems such as monorails. Live monorails are too expensive mainly due to low utilization. Gantries have been tried in the UK, and may appear too expensive at first glance. But one must consider use in low height crops and over benches.

With pot plants, over the bench carriers require careful development with a modular buildup. Conveyor systems, however, are space consuming. These systems are inflexible and uneconomic for occasional movement. A greater degree of flexibility can be obtained by the unit load system with direct stacking on pallets.

There are six principles to observe when considering a crops handling system:

1. Where will it eliminate all handling except essential moves?
2. Will it reduce loading and unloading to a minimum?
3. Can the containers be standardized, with the numbers of standards kept to a minimum?
4. Integrate the handling system with production.
5. Standardize equipment and layout for flexibility in the cropping sense.
6. Mechanize where economically justifiable, ensuring that the savings equals adequate return on the capital investment, and remove the peaks on the labor profile.