

ECONOMIC CONSIDERATIONS OF GRAFTED SEEDLINGS IN SOUTHWESTERN U.S. MUSKMELON PRODUCTION

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Muskmelon production in the Southwestern United States (US) has traditionally utilized soil fumigation to control soil-borne pests, fungal diseases, and certain weeds. *Meloidogyne incognita* is the most common root-knot nematode of economic importance to melon producers in California (LeBoeuf). A particularly injurious combination is *Meloidogyne incognita*, and a root rot and vine decline caused by the fungus, *Monosporascus cannonballus*. This fungal disease constitutes a serious threat to continued cultivation of muskmelons in the desert production regions of the Southwestern US. Preplant fumigation with 1,3-dichloropropene is effective for management of root-knot nematodes, but is limited against fungi like *M. cannonballus*. Preplant fumigation of pathogen-infested fields with methyl bromide has proven efficacious for disease control. However, grafting muskmelons to rootstock resistant to fungal diseases is another tool to control soil borne diseases difficult to control with 1,3-dichloropropene or similar chemicals. Grafting also provides an alternative for reducing the use of chemical fumigants applied to the soil, thereby lowering the threat of applied chemicals adversely impacting our ground water and the environment. In addition, crop rotations can be difficult to justify given high capital costs associated with installing subsurface drip irrigation and acquiring specific machinery for a given crop, plus the need to provide a continuous and reliable supply of muskmelons to consumers. Thus, crop rotations are not always a feasible economic solution to dealing with fungal diseases and soil-borne pests.

A primary objective of this research is to evaluate the trade-offs needed for grafting, which requires more expensive transplanting costs but less fungicide, to yield an equivalent economic return to conventional direct seeded muskmelons. To evaluate this objective, commercial field trials are compared from the fall of 2007, fall of 2008, and spring of 2009 that compare 1) direct seeding, 2) transplants grafted on hybrid squash (scion of 'Olympic Gold' (*Cucumis melo*) and rootstock of 'Tetsukabuto' (*Cucurbita maxima x Cucurbita moschata*), and 3) transplants of non-grafted melons in fumigated and non-fumigated rows. In addition, small controlled sections infested with root-knot nematodes in each non-fumigated row were made in order to examine the rootstock's response to different levels of root-knot nematode populations. Yield (lbs./acre) and market price differences for the size of cantaloupes harvested were considered along with differences in production costs for each of the three different configurations. Using conventional direct seeded cantaloupes as a base-line, break-even values are calculated for grafting and transplant costs to determine the relative value of grafting muskmelons on disease resistant root stock. Given that grafting currently adds around \$4,000/acre relative to the cost of growing direct seeded melons, substantial yield increases are

needed to pay for grafting if one considers only the economic costs and returns to the grower. Using some of the more favorable yield outcomes in comparing grafted transplants to direct seeded muskmelons, the cost of grafted transplants would need to drop to around \$0.25 per plant (\$0.17 per plant if one only considers the grafting cost and the rootstock seed priced at \$.08 per plant) in order to justify planting grafted transplants over direct seeded muskmelons. However, given the environmental benefits associated with reduced pesticide use, a possible market premium for growing more environmentally friendly, and the potential for robotic grafting to lower grafting costs, grafted transplants are being pulled from multiple sources to become a viable option for muskmelon production. In addition, a capital intensive irrigation technology like subsurface drip irrigation that limits crop rotations will likely accelerate the need for grafted muskmelon transplants.

LeBoeuf, J. 2002. Crop time line for Cantaloupes, Honeydews, and Watermelons in California. Report prepared for the U.S. EPA, Office of Pesticide Programs, Washington, D.C., pp. 1-34.

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