

Ground Floor Management and Rootstock Selection for Organic Apple Production

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The production of organically grown products continues to gain favor and interest by consumers. Consumers see organic products as arising from an agricultural management system that enhances biodiversity, which appreciates the nature of biological cycles, and stresses the importance of soil biological activity. A research and outreach project to grow organic apples was initiated in spring 2000 at the Clarksville Horticulture Experiment Station, Clarksville, MI. This is a study which includes scientists from many disciplines and an advisory panel of organic growers. Part of the research in the plot being carried out by horticulturists is to study the interaction of ground floor management systems and rootstock performance. We are using a hypothesis that rootstocks with higher vigor might compensate for greater stress imposed by weed competition and other pest infestations. A second hypothesis establishes the fact that soil cover and weed management affects the timing of N availability and uptake in the system, and impact apple tree's growth under organic production practices.

We began this work by establishing some 468 trees of Pacific Gala on three rootstocks, M.9 NAKB 337, M.9 RN 29 and Supporter 4. Trees have been trained to a Vertical Axe, planted at variable spacing of 1.35 (NAKB 337), 1.65 (RN 29) and 1.95 (Sppt 4) X 4.5 m apart with drip irrigation. The orchard floor is being managed within the protocols of three systems; mulching, weed suppression flaming and the Swiss Sandwich system. The mulch treatment is comprised of alfalfa hay laid in a 1 meter wide strip on each side of the row. The flaming treatment consists of the use of a Propane burner: 4 torches of 220,000 BTU/h on a strip 1 meter wide when vegetation grows over 10 cm high. The Swiss Sandwich System was developed at the Research Station for Organic Production, FiBL in Frick, Switzerland. The center of the tree row (60 cm wide) allows the development of spontaneous vegetation with two side strips (60 cm wide) tilled at each side. A rotovator and spring tooth harrow has been used when weeds get around 10 cm in height.

Preliminary Results

This was our first cropping year for the planting with limited volume.

- Treatments affect nitrate-N content in soil (Mulch showed the highest values)
- Total N in leaf tissue is being affected by the treatments but is at adequate levels.
- Rootstock vigor differences appear as expected with Sppt 4 > RN 29 > NAKB 337.
- The Ground Floor treatment effect is not having a significant impact on tree branch growth, but does effect trunk vigor.
- The first harvest showed differences among treatments and rootstocks, with a significant interaction between both factors. (Flaming lowest and M9-NAKB 337 highest).
- The volunteer vegetation (species) is changing in the sandwich strip.

Remarks

Applicability of the flaming needs more engineering and evaluation of the effect of heat . Mulching requires less maintenance but has some draw backs: rodents, fire, nitrogen and weed establishment in the mulch. Secondly, mulching effectiveness is heavily affected by redressing to compensate for decomposition. The sandwich system is simple to manage and results are promising in Michigan. It appears at this time that an adjustment is needed related to area of soil inhabited by vegetation versus tilled area.

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