



Great Lakes Fruit, Vegetable & Farm Market EXPO Michigan Greenhouse Growers EXPO

December 5-7, 2017

DeVos Place Convention Center, Grand Rapids, MI



Apple I

Where: Ballroom D

MI Recertification credits: 2 (1C, COMM CORE, PRIV CORE)

CCA Credits: PM(1.0) CM(1.0)

Moderator: Chris Kropf, MSHS Board, Lowell, MI

- | | |
|---------|---|
| 2:00 pm | Advances in Monitoring of Brown Marmorated Stink Bug <ul style="list-style-type: none">• Greg Krawczyk, Entomology Dept., Pennsylvania State Univ. |
| 2:25 pm | Apple Insect Pest Management Update <ul style="list-style-type: none">• Larry Gut, Entomology Dept., MSU |
| 2:45 pm | Safepod DCA plus Respiration: Intelligent and Predictive Management of CA Storage <ul style="list-style-type: none">• Randy Beaudry, Horticulture Dept., MSU• Glade Brosi, Storage Control Systems, Sparta, MI |
| 3:10 pm | Update from Michigan Apple Committee <ul style="list-style-type: none">• Diane Smith, Michigan Apple Committee, DeWitt, MI |
| 3:30 pm | Strategies for Pruning in High Density Planting Orchards <ul style="list-style-type: none">• Nicola Dallabetta, Fondazione Edmund Mach, Italy |
| 4:00 pm | Session Ends |

GRANTS

Grants help MAC to leverage grower dollars and put more focus on important target audiences.



2016/17

Social Media - Consumer Engagement - \$63,792
Advertising and Social Media Showcasing Apple Availability - \$29,900

2017/18

Enhancing competitiveness of Michigan Apples through consumer education online and in print - \$100,000



Partnerships:

PURE MICHIGAN



MAC collaborates with USAApple in educating lawmakers and the public about industry issues, including:

- Federal policy issues like labor, food safety and trade
 - Nutrition and health research, including disseminating information to the public
 - Industry information for growers, lawmakers and consumers
- MAC and USAApple work together to cultivate upcoming leaders through the Young Apple Leaders program and several Michigan growers serve on the board and committees that guide the future of the national organization.

RESEARCH

MAC funded 24 projects for \$439,595 in 2017



Continued partnership with Fruit Quarterly research publication
Market research examining consumer trends



MICHIGAN APPLES

WHERE APPLES LOVE TO GROW™

KEY ACCOMPLISHMENTS 2017



(800) 456.2753 • MichiganApples.com

PURE MICHIGAN

13750 S. Sedona Parkway, Suite 3, Lansing, MI 48906

MARKET DEVELOPMENT

In FY 2016/17

174 fresh contracts

649 key account ads using Michigan Apples logo or stating "Michigan Apples"

21 processor contracts

653 store checks conducted

22 trade/retail shows

3,030 bins/grades placed



RETURN ON INVESTMENT



Ad Programs w/ Large Accounts
\$0.25 cost per case



Ad Programs w/ Regional Accounts
\$0.63 cost per case



Demo Programs
\$2.82 cost per case



Processed Programs
\$0.78 cost per case

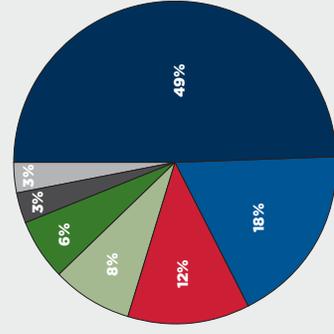
Store Checks: On average, 21 store checks made weekly

Ad tracker: Tracks 78 key accounts weekly

PUTTING GROWER DOLLARS TO WORK

2017/18 MAC Budget Allocations

Retail Programs	\$1,242,984
Education	\$462,778
Research	\$314,749
USApple	\$193,009
Operating	\$165,300
Export	\$80,821
Grower Outreach	\$87,056
TOTAL	\$2,546,698



EDUCATION & COMMUNICATIONS

Grower communications:



Educational videos:

Four new recipe videos as well as one new grower profile were added to our YouTube channel, and videos shared on Facebook. The videos have garnered **113,874 views** so far.



Official Dietitian of Michigan Apples

In 2017, Shari Steinbach, formerly retail dietitian for Meijer, signed on as the official dietitian of Michigan Apples. Her work includes creating online content, acting as media spokesperson and creating a toolkit for retail dietitians, to be released in 2018.

Traditional media:

578,844,347 impressions

1,440 stories

Social media:

In recent years, MAC's approach to consumer education and communications has shifted. With a focused effort to engage with our target audience on social media platforms, we have seen a great deal of growth in our online audience.

- Facebook:** likes up 26%
- Instagram:** followers up 66%
- Twitter:** followers up 39%
- Pinterest:** followers up 27%
- YouTube:** subscribers up 181%

Print advertising:



Events:

- United Show, Chicago
- Midwest Produce Show, Kansas City
- Mark Dantonio Radio Show, Michigan State University Athletics/Fox Sports
- Bank of America Chicago Marathon
- PMA Fresh Summit Show, New Orleans
- Zoo Boo, Detroit Zoo
- Spooky Zoo, Lincoln Park Zoo
- World Food Championships, Orange Beach, Alabama



A Seat at the Table

MAC represents the Michigan Apple growers in many venues, serving as the voice of the industry with a number of groups including:

- USDA Fruit and Vegetable Advisory Committee
- State and federal agencies
- Environmental Protection Agency
- State and federal elected officials

MAC addresses many issues including FSMA, crop insurance, labor, and other policy work on behalf of growers.

Strategies for Pruning in High-Density Planting (HDP) Orchards

Nicola Dallabetta
Foundation Edmund Mach (FEM)
Technology Transfer Centre
Via Mach 1, 38010 San Michele all'Adige (Trento) Italy
Office phone: +39-0461-609143
Mobile: +39-335-1224848
Website: www.fmach.it
E-mail: nicola.dallabetta@fmach.it

Introduction

Pruning, a main technical operation in the apple orchard is related to many factors ranging from the type of environment, to cultivar and rootstock along with other field practices such as crop load and thinning, to fertilization and irrigation. Training systems and tree density do have a determinant impact on the choice of pruning method to be adopted in the field. Training systems are closely related to tree densities (Robinson et al., 1991; Hampson et al., 2002; Licznar-Maanczuk, 2006) and consequently even pruning methods (Tustin, 2000; Özkan et al., 2009).

A good example to cite comes from my region of Trentino in North of Italy. In the last three decades, several changes took place in the apple orchard system from training systems to tree density to pruning methods, due to the introduction of M9 rootstock. In the 90's apple trees were trained to Spindle system and tree density was around 2200 trees/ha (890 trees/acre). Nowadays, apple orchards adopt a high density planting (HDP) systems that range from 3125 trees/ha (1265 trees/acre) to 5952 trees/ha (2409 trees/acre) using mainly Slender Spindle and seldom Bi-axis training systems. Along the same time line, pruning methods changed from long to short cut.

Long cut pruning was proposed by Lespinasse (1977 & 1980) to control tree vigour and yield in large planting distances, which suited the conditions of Trentino region in the early 1990's. While long cut pruning allows the development of vigorous permanent branches from the central leader stem, Robinson et al. (1997) introduced the removal of these at the top of the tree thus giving a conical shape. The canopy was finally formed by young temporary fruitful branches at the top and permanent longer branches at the bottom part of the tree. This is referred as the standard method in this presentation, which was the most used in Trentino and seemed to perform well until the early 2000's.

However, in the last decade, tree density increased but pruning methods were not completely updated, leading to a failure in production and fruit quality in most of the HDP orchards. Intensive orchards can be successful in the first years but if they are not properly pruned, they may have poor light distribution in the denseness of the branches and foliage within the small canopy. It is known that light is very important not only for the improvement of fruit quality but also influences tree vigour and productivity in successive years (Rom, 1991). As a result, this forced the growers to renovate their orchards after 10-12 years, not enough to pay off the high initial investment cost of an intensive apple orchard.

To address, the shading effect and the lack in fruit quality and yield, many growers in my region, changed their mind from long or standard to short cut pruning methods such as the "Click". This technique was created in The Netherlands and Belgium, to ameliorate light penetration in the canopy. It consists in heading back the leader and the basic scaffold branches on new wood at the second-third-bud level. This can promote a better flower bud formation even on one-year old branches as observed by Mohammadi et al., 2013. The lateral limbs are continuously renewed to obtain fruiting branches of 2-3-4 years only. Branch renovation in the Click method also involves the basic scaffold branches (Fig. 1) allowing better light penetration also in the lower part of the canopy. Old lateral branches are removed when they are too old or too big ($> 1/3$ or $1/2$ of the diameter of the central leader) by cutting the head and leaving a stub to facilitate shoot renovation. This helps to maintain the canopy size within its original planting distance.

During the last years other pruning cut methods similar to Click have been adopted by the growers with the objective to promote fruiting branches by heading back several fruiting limbs in the middle part of the canopy (Fig. 2).

What are the advantages to apply a short cut pruning in HDP apple orchards?

- Short cut pruning aids in a continuous branch renovation with an objective to produce fruits on a narrow range of young wood age to improve fruit homogeneity and quality without affecting fruit production (Dallabetta et al., 2014) (Fig. 3). It is known that bud wood age, type of flower cluster and their position affect apple fruit quality (Volz, 1992 and Volz et al., 1994) and ripening (Skrzyński and Streif, 1996). Branch renewal strategy has shown also to increase photosynthesis, promote shoots growth, and improve yields and fruit weight in apple (Tustin et al., 1988; Warrington et al., 1995; Li MingXia et al., 2011). Renovation of limbs promotes fruiting shoots for early cropping, and contemporarily overcomes alternate bearing (Ventura and Sansavini, 2005).
- Short cut pruning helps to reduce fruit number and facilitates chemical thinning leading to a regular yield over the life span of the orchard (Fig. 4).
- Dallabetta et al., (2014) demonstrated how short cut pruning forces the plant to stay in its established space as a result of its compact and cylindrical shape (Fig. 5). Tall narrow trees in proper spaces have shown to increase fruit quality in the lower part of the canopy (Robinson et al., 2006). This also can enable mechanization, easy management technical operations and netting.
- Short cut pruning requires more time in winter compared to other techniques but reduces labor during the vegetative season (Dallabetta et al., 2013) in the initial years of orchard life (Fig. 6).

Conclusions

- ✓ The choice of “Pruning method” strongly depends on tree density.
- ✓ It is important to respect planting distances.
- ✓ Pruning has a high influence on tree size and shape.
- ✓ Shoot renewal is essential to obtain better light penetration within the canopy, which increases yield and fruit quality.
- ✓ A continues limb renewal strategies increases fruit homogeneity. This can benefit the grower and the whole fruit chain from storage to the market and consumers.
- ✓ No permanent limbs is advisable in HDP over 4500 trees/ha (1820 trees/acre)!
- ✓ Short cut pruning has a positive effect on fruit size, facilitates thinning, and harvest (could reduce pick number or increase the percentage of fruit of the first pick in bicolor cultivars).
- ✓ Pruning can be expensive but an accurate pruning in winter reduces labor during growing season!

Literature

Dallabetta N., Guerra, A., Pasqualini, J., 2013. Fusetto del melo con potatura corta: la variante del “metodo Click” in Trentino. *Frutticoltura* 7/8: 64-70.

Dallabetta, N., Forno, F., Mattedi, L., Giordan, M., Wehrens, R., 2014. The implication of different pruning methods on apple training systems. *Agriculture & Forestry* 60 (4): 173-179.

Hampson, C.R, Quamme, A.H. and Brownlee, R.T. 2002. Canopy growth, yield, and fruit quality of Royal Gala apple trees grown for eight years in five tree-training systems. *HortScience* 37 (4): 627-631.

Lespinasse, J.M. 1977. La conduite du pommier: I. types de fructification. Incidence sur la conduite de l'arbre. Paris: INVUFLEC: 80

Lespinasse, J.M. 1980. La conduite du pommier: II. L'axe vertical. La renovation de verges. Paris: INVUFLEC: 120.

Licznar Maanczuk, M. 2006. Training system and fruit quality in apple cultivar Jonagold. *J. Fruit Ornam. Plant Res.* Vol. 14 (2): 213-218.

Li MingXia, Geng GuiJun, Bai GangShuan, Du SheNi and Li JingJing, 2011. Effect of renewal pruning on apple photosynthetic ability and fruit quality in final full productive stage. *J. Northwest A & F University - Natural Science Edition* Vol. 39 (1): 179-185.

Mohammadi, A., Mahmoudi, M.J. and Rezaee R. 2013. Vegetative and reproductive responses of some apple cultivars (*Malus domestica* Borkh.) to heading back pruning. *International J. AgriSci.* Vol. 3 (8): 628-635.

Özkan, Y. and Kücükler, E. 2009. Pruning and Training Techniques in Dwarfing Apple trees. *Tabad* 2 (1): 1-9.

Robinson, T.L., Lakso, A.N. and Ren, Z. 1991. Modifying apple tree canopies for improved production efficiency. *Hortscience* Vol. 26 (8): 1005-1012.

Robinson, T.L., Hoying, S.A. and Smith, W. H. 1997. Training strategies for high-density orchards of the future. *New England Fruit Meetings* Vol. 103: 27-36.

Robinson, T.L., Hoying, S.A. and Reginato, G.L. 2006. The Tall Spindle apple planting system. *New York Fruit Quarterly, New York* Vol. 14 (2): 21-28.

Rom, C.R. 1991. Light threshold for apple tree canopy growth and development. *HortScience*, Vol. 26 (8): 989-992.

Skrzyński and Streif, J. 1996. Does age affect variation in the fruit maturity or quality within the tree. 4th Meeting of the Working Group on Optimum Harvest. Date Location: Lofthus Norway Date: June 09-10, 1994. Cost 94 The postharvest treatment of fruit and vegetables – determination and prediction of optimum harvest date of apple and pears: 127-131.

Tustin, D.S. Hirst, P.M. and Warrington, I.J. 1988. Influence of orientation and position of fruiting laterals on canopy light penetration, yield and fruit quality of “Granny Smith” apple. *J. Amer. Soc. Hort. Sci.* 113 (5): 693-699.

Tustin, D.S. 2000. The Slender Pyramid tree management system - pursuit of higher standards of apple fruit quality. *Acta Hort.* 513: 311-319.

Ventura, M. and Sansavini, S. 2005. Tipologia di rami a frutto e qualità delle mele cvs Braeburn, Golden Delicious e Jonagold. *Frutticoltura* 11: 52-61.

Volz, R.K. 1992. Fruit quality and productivity on apple replacement branches. Thesis, Massey University, New Zealand.

Volz, R.K., Ferguson, I.B., Hewett, E.W. and Woolley D.J., 1994. Wood age and leaf-area influence fruit size and mineral composition of apple fruit. *J. Hortic. Sci.* Vol. 69 (2): 385-395.

Warrington, I.J., Stanley, C.J., Julian, J.F., Tustin, D.S., Hirst, P.M. and Cashmore, W. 1995. Pruning strategies for restructuring top-dominant central leader 'Granny Smith' apple trees. *New Zealand J. of Crop and Hort. Sci.*, Vol. 23: 315-322.

Figures



Fig.1. Basic scaffold branches renewed by the Click method.

Fig. 2. Head back fruiting limbs in the middle part of the canopy to promote brindles formation.

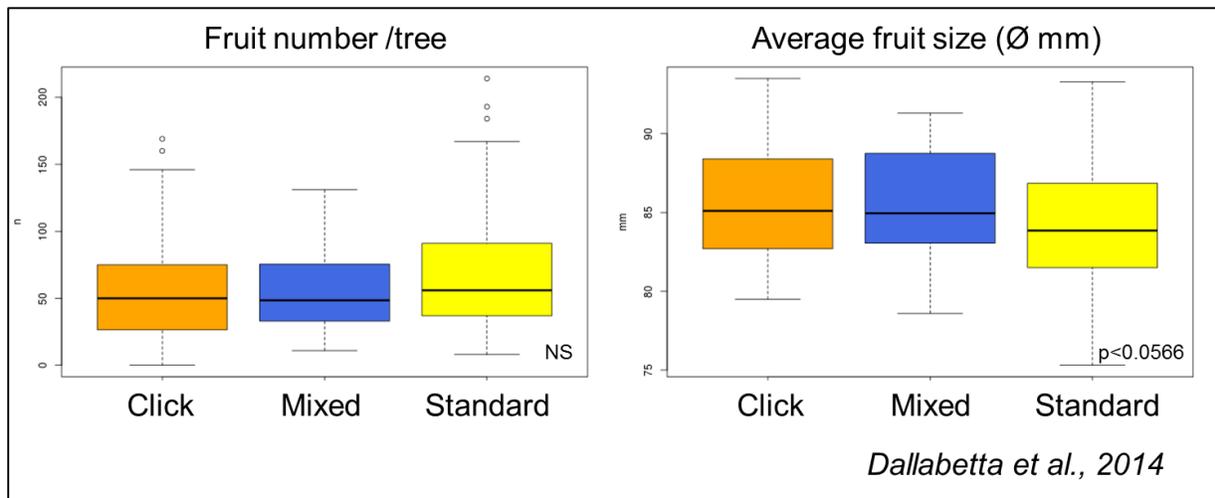


Fig. 3. Head back fruiting limbs in the middle part of the canopy to promote brindles formation.

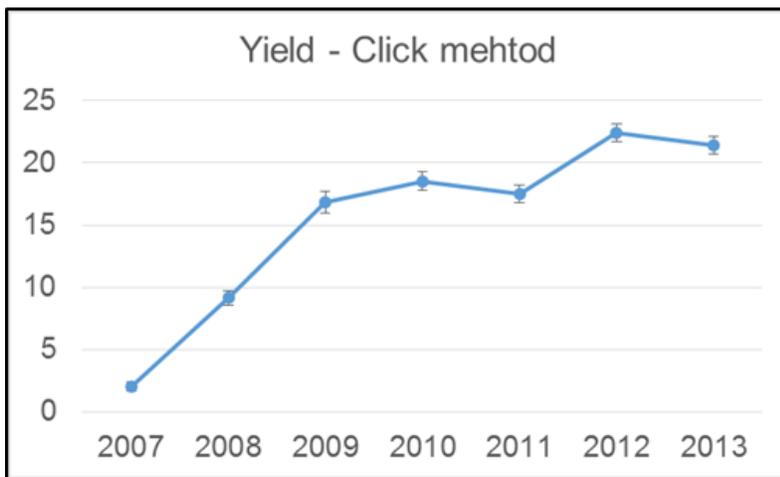


Fig. 4. Regular yield achieved by adopting the “Click”.



Fig. 5. Compact Tree architecture obtained by the Click method.

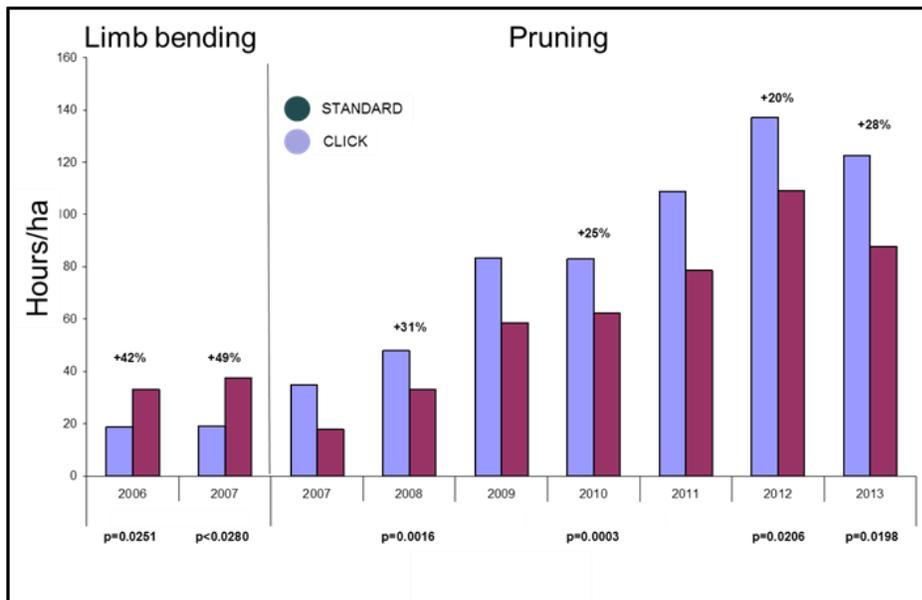


Fig. 6. Pruning and limb bending time consuming by adopting standard and Click method.