Department of Horticulture
MICHIGAN STATE UNIVERSITY

COMPACT FRUIT TREE

ROOTSTOCK BEHAVIOR
SPUR TYPES
INDUCED DWARFING
CULTURAL PRACTICES

THE INTERNATIONAL DWARF FRUIT TREE ASSOCIATION

No. 4, December, 1977 - Prepared by Robert F. Carlson

PREVIEW OF 21st ANNUAL CONFERENCE IDFTA

The dates of the 21st Annual Conference of the International Dwarf Fruit Tree Conference are March 1, 2, and 3, 1978, and the location is the Pantlind Hotel, Grand Rapids, Michigan.

The feature speaker for the Conference will be Dr. John Jackson of East Malling Research Station, England, who will appear twice on the program. Dr. Jackson is well known and versed on many fruit growing topics. Currently, he is Deputy Director of the East Malling Station. In September, 1976, he and Dr. Bünemann were Co-chairmen of the High Density Fruit Tree Symposium held at Wye College, England, and sponsored by the International Horticulture Society. Dr. Jackson will bring members up-to-date on performance of old and new rootstocks developed in England as well as on tree densities, nutrition, chemical growth control, light factors, etc. Detailed titles will be listed in the program.

Mr. Gragg Gilbert, fruit grower in Yakima, Washington, has consented to speak on fruit growing trends in Washington. As an "apple knocker" Gragg can talk facts and figures on practical, down-to-earth fruit production and marketing. He is a Board member of Tree Top Incorporated. He asked me not to tie him down to a special subject so we shall make that general.

Another feature speaker will be Dr. John Archibald, Director of the Horticulture Research Institute of Ontario Vineland Station, Canada, who will speak at the Banquet. John is no stranger to this Association, having hosted the 1977 summer tour, having "picked up" some of his education in Michigan, having traveled extensively world-wide and having produced fruit on his own farm, he comes qualified to speak on International Horticulture.

Most important, there will be panel discussions covering practical experiences by growers and professional pomologists. Some topics to be covered will be how to handle crowding trees on high densities, use of Alar for vigor control and nutrition for good growth and fruit.

Ladies luncheon and program promises to be interesting. Part of the program will be devoted to discussions on foods and fancies in Japan and China by the ladies who were on that tour to the Orient.

Members of the Rootstock Research Committee will give progress reports on developments of new rootstocks and on promotional programs for the support of old and new rootstock research.

An interesting and informative half-day orchard tour is being planned to see some of the well managed, high density orchards on the fruit ridge. There will be a chance to observe and discuss prearranged pruning and tree training demonstrations as well as on-the-spot pruning by the "experts." Busses will be available to accommodate all on the tour.

Citrus tree size control will be a new topic for this 21st Annual Conference. We in the North no doubt can learn from what is being done to control tree growth in orange and grapefruit. The exchange is mutual and the distance is short. We welcome this North-South and East-West free exchange of ideas and trends.

Ample time will be allowed for questions to be answered during the Conference. You can bring questions, send them in, ask them from the floor or drop them in the question box.

Evening concurrent sessions will feature discussion on rootstocks and tree densities for stone fruits, pre-planting procedures for all compact trees and tree supplies, and travel epics of international flavors. One-half hour at the end of each session will be open for questions and comments from the audience.

Fruit growing in China and Japan promises to be another interesting topic to be discussed during the 21st Annual Conference. The best color slides from the 28-day tour will be shown and described in three half-hour sessions. Two sessions will be devoted to fruit growing in Japan and Peoples Republic of China and one session will be an overview of the entire trip - San Francisco, Tokyo, Peking, Kwantung and Hong Kong.

Fruit tree nutrition will be covered by a two-member panel, namely: Drs. Gene Oberly of Cornell University and Norman Childers of Rutgers University. Dr. Charles Kessner, Michigan State University Extension Horticulturist, will moderate this panel and comment on nutrition for cherry trees.

PRUNING FOR TREE HOLDING

At the time the apple trees start to touch in the row, that is the time to take action to control further perifery shoot extension growth. This usually occurs in the fifth or sixth year when the planting is getting into good production. It often seems drastic to have to cut off or cut back good, potential fruiting branches. However, there are only three alternatives, namely: control tree growth, live with tree crowding and shading or remove some trees. The last choices we do not want or need, so start tree control before it is too late.

The controlled pruning means that some of the main scaffolds are actually shortened by cutting off a portion of the terminals. This practice should be selective rather than extensive and should not all be done in one year, but some each year as needed. Controlled pruning of this kind results in more compact trees without loss of fruiting area because the inside of the trees remain productive.

OBSERVATIONS FROM SOUTH AMERICA

Leaving New York on a cold, rainy day late October, I arrived eleven hours later in Santiago where spring was in full bloom, and fruit starting to take on form. Yes, this is reversed season so as you read this, growers in the Southern hemisphere will be putting on the third or fourth fruit cover spray and "basking" in the sun.

After spending a full week visiting fruit farms and meeting with several grower groups starting in the south at Curico then moving northward to San Fernando west to Perallio, then north to Rancagua, Santiago and San Felipe, one realizes that Chile has a great potential for fruit production. Current orchards are variable in age, size and management. However, with land reform in progress allowing farmers to purchase land and manage it, new incentive in agriculture was very evident.

The fruitgrowers, both new and more experienced, are eager to learn about rootstocks for growing smaller, manageable trees and how to handle them from planting to maturity. The soils are variable, from heavy clays to clay loams. The lighter clay soils, which are well drained, appear to be suitable for fruit crops.

In the San Felipe Valley, about 60 miles north of Santiago, table grapes and peaches are grown. This Valley has excellent soil and climate for these crops.

The pomologist and pest control personnel at the University of Chile are working closely with the growers in advancing some of the new technical aspects of fruit growing.

During a week in Uruguay, I had a chance to observe changes since our last visit two years ago. Aside from a few changes in personnel at the Las Brujas Research Station, some progress was observed in the fruit tree research and nursery management programs.

A very small crop was harvested in Uruguay in March, 1977, causing concern to growers. The fruit set as observed the first week in November looked good, indicating higher yields in March, 1978. The growers are advancing well in new fruit growing techniques. Having an unusually slick clay-type soil, the growers are handicapped; however, tree survival and growth is surprisingly good. More desirable fruit land is located to the west of Montevideo, but it is costly and often impractical to move a well established fruit industry. However, it may be in future plans.

SUMMER ORCHARD STUDY TOUR

June 18, 19, and 20 (Sunday, Monday and Tuesday), 1978, are the dates for the Annual Orchard Study Tour sponsored by the International Dwarf Fruit Tree Association. The Tour will cover some of the leading fruit areas of Massachusetts and New Hampshire. The Tour plans are being formulated by Dr. Bill Lord, University of Massachusetts, and Joseph Costante, University of Vermont, and local area horticulturists and growers. Some features will be: Management of pick-your-own orchards, commercial plantings of different varieties and rootstock, as well as research fruit plantings.

STUDY TOUR TO EUROPE

June 30 to July 15, 1978, are tentative dates for looking at research and commercial fruit plantings in England, Poland and Holland. In England, both East Malling and Long Ashton Research Stations are in the plans for visiting. Some commercial orchards in Kent and Gloucester will be visited. The next stop is Poland where the fruit tree research station at Skierniewice promises to be interesting because we will see the bearing of apple trees on the P-Clone rootstock series. Fruit areas will also be part of the visit. Holland is always a high spot for seeing various tree densities of spindle bush training. The fruit station at Wilhelminadorp also will be visited. In each country a free day will be planned for on-your-own exploring (shopping) in London, Warsaw and Amsterdam.

The group (35 total) will be composed of pomologists and fruit growers and spouses. First announcement was in the September Newsletter so now there are only 15 spaces available. Total cost of this 14 to 21 day tour has not yet been computed, but guestimates are from $1,200.00 to $1,500.00. Please contact 303 Horticulture, Michigan State University, East Lansing, MI 48824 if you plan on taking part in this orchard study tour.

BRANCH BENDING

Mr. T. Jacyna of the Dabrowice Research Station, Poland, confirms the principle that branch or shoot bending slows down growth and increases productivity. Yields were increased when shoots on individual branches were bent to horizontal position on the Bancroft apple variety. Bending in March was superior to that done in June.

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On behalf of the Officers and IDFTA Board members, we send our best wishes for a happy holiday season and a happy, fruitful and prosperous 1978.

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Volume 10, No. 2, July 1977 - Prepared by Robert F. Carlson

'MUTSU'--THE UNDERRATED CULTIVAR

Those who have had the opportunity to eat a 'Mutsu' apple in May must agree that it is an excellent eating apple. At that time of year, it compares, in storage quality, with 'Idared', even when stored under non-CA conditions at 34°F.

Mutsu, having originated in Japan from a cross made in 1930 at Aomori Station of Golden Delicious x Indo, is a green apple with a yellow cast if allowed to tree ripen, with some fruit taking on a reddish blush when fully exposed to sun during ripening. The fruit is large, thus gaining good stead with processors for slicing and sauce.

Being a triploid, the tree is vigorous, but rather precocious when on any of the semi-dwarfing (MM 106 or M.7), or the more dwarfing (M.26 or M.9) root-stocks. 'Mutsu'/M.26 could be spaced 9' x 15' on an average soil and site. It requires pollen from other cultivars for good fruit set, such as 'Golden Delicious', 'Cortland' or 'McIntosh'. It has very few faults, one is that in some locations, the fruit will pick up bacterial spot, a lenticel skin condition which will reduce its attractiveness, but for peeling, it is no real handicap. It is not resistant to fire blight, but of medium susceptibility.

The 'Mutsu' producing large, firm and crisp fruit has been renamed 'Crispen' in England. This is a very descriptive name for it, but be it 'Mutsu', 'Crispen', or any other name, it is worthy of trial in any fruit area. This is not to suggest that growers should plant large acreage of Mutsu, although it is worthy of trial as a dual purpose crop fresh or processed.

SUMMER PRUNING

The end of July and throughout August is a good time to check your orchard for growth control and light exposure to the crop throughout the trees. It may be that summer pruning fits your orchard, time shcedule, and management program.

Essentially, summer pruning effects your orchards in 4 ways: 1) It reduces tree heighth and spread so that it is easier to move through and provide better spray coverage; 2) It improves light penetration, thus improving fruit color, and perhaps size, because leaves inside the tree become more

photosynthetically efficient; 3) According to H. Utermark (Compact Fruit Tree, vol. 10, pg. 88), summer pruning improves fruit quality and reduces incidence of bitterpit; and 4) It helps to keep trees in allotted space in high density orchards.

What and how much to prune off during summer depends on cropping condition and age and size of trees. Certainly, if fruit load is good, it is a matter of removing only one of current season's growth at the base, or leaving 4" at the base in some shoots to allow some shoot and spur formation. Most of the cuts should be done in the top half of the tree. However, if trees are crowding, some branches may be shortened back into 2- and 3-year-old wood. In this case, make the cut outside a weaker side lateral (Compact Fruit Tree, vol. 10, pgs. 77-85).

What about mechanical hedging in the summer? This is being researched at different research stations and in growers' orchards. It has great possibilities, because it treats all trees in the row the same, and it eliminates quite a lot of shoots, depending on depth of the cuts. Topping alone is not suggested, but rather slab trees at 45^{o} angle on both sides is suggested.

In 5-year-old trees, and older, hedging looks promising. If trees are machine hedged, it is a must to come behind and remove cut branches and make corrective cuts to eleviate the "stubbed" appearance, and thus have less shoot growth. Stubs should be cut outside a sublateral.

UPDATE ON CURRENT ORCHARD PRACTICES

Tree trunk protection. The trunk section of most fruit trees is a vulnerable part. It is subject to collar rot, to "southwest" cold injury, to rodent damage, to shaker injury and probably to herbicide effects. The trunk is also the last part of the tree to become dormant, thus often leaving it unprepared for low early fall and winter temperatures. Several items can be listed to partially protect the trunk and graft union area.

Gravel placed at the base of the trunk will keep that portion dry, discourage weed growth and rodent damage, and lessen chances of collar rot. The important part in use of gravel or course sand is to first lightly mound the soil up around the trunk so that water will drain away from the trunk. To do this with apple trees, the graft union should be 2 or 3" above ground level so that it will not be covered with soil. After this tree preparation, add gravel around the trunk in a 24" circle and to 4" depth.

The mouse guard can easily be sunk into the gravel. The quarter-inch hardware cloth over the years has given excellent protection, and yet allows the trunk to properly harden off in the fall.

Painting the trunk with white water soluble outdoor latex paint will keep trunk temperature more even during the winter's fluctuating temperatures. After trunk increments have taken place from season's growth is a good time to paint the trunks. The paint can be brushed on, dabbed on with a soft mitten or sprayed on after diluting with water to proper consistancy.

July and early August is a good time to remove some fruit from the top of the central leader of young fruit trees. Precocious varieties on the more dwarfing rootstocks tend to set up too many fruit in the top of the leader.

Branches on 3- to 5-year-old trees are also easy to spread this time of the year. If the lower branches have previously been spread, however, move spreaders to higher scaffolds. If blight is present, it is best to hold off spreading until later.

CULTIVAR ADAPTABILITY TO CLIMATES

After recently seeing fair to good fruit set in Gordon Yates' orchard in Minnesota, one wonders if climate or location, or both, are factors. Most certainly both are. The Minnesota bred 'Harolson' and 'Beacon' had a good set.

Over the years, Gordon has learned how to manage apple trees for annual production in an area that is cold, subject to blight and hail. Having plenty of land, he does not hesitate to remove alternate trees when crowding. This improves air circulation, which is an important factor where spring frost can be a problem.

1978 ANNUAL CONFERENCE

The 21st Annual Conference of the International Dwarf Fruit Tree Association will be held at and Grand Rapids March 1-3, 1978. This year, we will limit the orchard tour to half a day to provide more time for discussion and informal sessions. The program will deal with problems currently associated with rootstocks and cultivars. A variety of speakers from several states, Canada and Europe will update both research and orchard findings of importance to all members.

We need input for the program, especially as to suggestions of qualified persons who can participate in some part of the program. First hand experience of detailed method of culture, of local adaptability of a cultivar or rootstock, or of unusual yield performance due to particular management (or of particular problems) are some of the factors which add up to a meaningful program. So send your program suggestions and names of prospective speakers or panel members to me at your first opportunity.

SUMMER ORCHARD TOUR

The annual orchard tour of the IDFTA held in Ontario, Canada drew a crowd of ver 300 persons. Although many came from far and wide, all were well accomodated with food and lodging. Our Canadian hosts did an excellent job in planning and guiding the 2-day tour.

The growers' orchards that we visited were well managed and manicured. No standard orchards were seen, but most were semi-dwarf and dwarf plantings. Fruit set varied some from one site to the next, but in general, a fair crop of apples is forecast for most of the fruit areas in Ontario.

Of much interest to the members were the many and varied orchard test plantings at the Horticultural Research Institute of Ontario at Vineland. Some of the plantings involved rootstocks, while other plantings involved tree spacing and tree management.

At this time, we (members of the IDFTA) extend our sincere thanks to the personnel at the Vineland Station who were involved in setting up the meeting. Special appreciation and thanks goes to Drs. A. Hutchinson and E. Anderson who put much effort and time into a most successful and educational orchard tour. We also wish to thank the growers whose orchards we visited.

COMPACT FRUIT TREE - VOLUME 10, 1977

Volume 10 was mailed to all members the last week in June. This volume of 131 pages covers a varied range of subject matter pertaining to fruit growing. A timely subject covered in two different articles deals with summer pruning, giving reasons for pruning at certain times and effects obtained. In the future, summer pruning no doubt will be part of tree management of both pome and stone fruit--especially high tree densities.

Summer pruning should not be confused with winter or dormant pruning. These are distinct entities, and each has a different purpose and effect. Dormant pruning, in general, aims at developing a structured tree of a predetermined pattern such as spindle form with a central leader, or perhaps a trellis system; whereas summer pruning (as described in volume 10) means pruning in the periphery of the tree for better light exposure and growth control. Most of the cuts are made to remove some of current shoot growth and some of past season's growth.

Other papers in this volume cover such subjects as growers' experience with compact trees; rootstock research and breeding; costs of establishing orchards; effects of ringspot virus in apple; fruit growing in Germany; high density peach orchards; temperature variations and hardiness; and update on mechanical harvesting.

For extra copies ($5.00 each), contact 303 Horticulture Building, M.S.U., E. Lansing, Michigan 48824.

JAPAN/CHINA TOUR

A group of 21 persons (horticulturists and fruit growers) are ready to leave for a fruit study tour of Japan and China. These IDFTA members come from: Michigan (4), Minnesota (2), Indiana (2), Illinois (2), New Jersey (1), Pennsylvania (1), Washington (4), West Virginia (1), Wisconsin (4). We should have some interesting reports for the 21st Annual Conference at Grand Rapids, March 1-3, 1978.

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Vol. 10, No. 1, May 1977 - Prepared by Robert F. Carlson

INTERNATIONAL DWARF FRUIT TREE SUMMER TOUR

June 19-21, 1977

The annual orchard study tour of the International Dwarf Fruit Tree Association will be hosted this year by research personnel at the Vineland Research Station and fruit growers in the Milton area and Niagara Penninsula.

Program and Itinerary

Sunday, June 19

6:30-7:30 p.m. - Purchase your bus tickets
7:30-8:30 p.m. - Welcome and Orientation session at the Horticultural Research Institute of Ontario, located between Queen Elizabeth Way (Highway) and Lake Ontario at Regional Road 24. Stay overnight in vicinity for night of 19th and 20th. (See list of motels and camps and map of locations.)

Monday morning, June 20

Buses arrive 8:00 a.m. and depart 8:30 a.m. from HRIO Vineland for visit to 3 orchards:

9:15-10:30 a.m. - Herb Wood, Burlington: 7,000 trees on 20 acres 6,000 on M.9, 1,000 on M.26, 10 varieties

11:00-11:30 a.m. - Bill Vandervinde Orchard: about 40 acres, M.2, 7, & 9 - an excellent example of mold and hold with trees M.7 & M.2

12:00-1:00 p.m. - Catered lunch at Kelso Conservation Authority (near Ontario Agricultural Museum)

2:00-4:00 p.m. - Chudleigh's Pick-Your-Own: 72 acres, 40 A on M.9, 32 A on Mallings 7, 26, 111, 104, 2, 106
Tour group will be shown around as prospective Pick-Your-Own customers.

4:00-5:00 p.m. - Look at equipment displays and commercial demonstrations

5:00-7:00 p.m. - Barbecue

8:30 p.m. - Arrive back at HRIO Vineland - Free Time

Tuesday, June 21

Buses leave for Tour of the Horticultural Research Institute, Vineland Station, Ontario:

Apple and pear planting systems
3 Acre bed plantings of apple, 3,000 trees, 3 rootstocks, 4 varieties
Palmettes - dwarf apple and pear
Free standing hedgerow
Apple variety and Museum Orchard over 300 varieties
Budding in situ on M.9 and M.26, cropping in 3rd year
Nursery and stoolbeds - hedges for hardwood cuttings
New rootstock clones for Rootstock Research Foundation Trials
Replant studies
Plantings for use of mechanical aids in harvesting
Equipment - Pluk-O-Trak, Over the Row Tractor, etc.

12:30 p.m. - Lunch - catered at HRIO

1:30 p.m. - Depart on buses for tours of growers' orchards

(1) Ron Moyer, R.R. #1, Grimsby, 4 acres
High density apples - bed systems, hedgerows, in situ budding & interstocks
(2) John Steward, Beamsville, M.9 and M.26 on wires
(3) Gilles Overbeeke, R.R. #4, Fenwick

4:00-4:30 p.m. - Back at Vineland Station

Costs

Allow about $7.50 per person for buses for 2 days and about $6.00 for the barbecue. Lunch each day may run $3.00-$4.00.

NEW ROOTSTOCK DESCRIPTIONS

MAC-9. This rootstock is one of the most dwarfing in the new MAC series of apple clones developed at MSU. After more tests with different scion cultivars, others in this series may be as dwarfing. It was selected from open pollinated seedlings of M.9. Some of the outstanding features of MAC-9 are: 1) good precocity 2) strong root anchorage 3) excellent dwarfing - slightly larger than M.9 and smaller than M.26 4) relatively easy to propagate by stooling or cuttings 5) productive with varieties such as standard Delicious and Jonathan tested to date. The morphological description of MAC-9 will be forthcoming in a later issue.

The major propagation and distribution of trees on the newer rootstocks will be by west coast nurseries where conditions are most favorable for propagation. First distribution or sale of these trees will be to research stations wanting to test these newer stocks under local soil and climatic conditions. At least 2 years will be required before trees of leading varieties on MAC-9 will be generally available. Progress reports on this aspect will be forthcoming.

Available lodging and camping for the annual summer orchard tour at Vineland, Ontario, June 19-21, 1977.

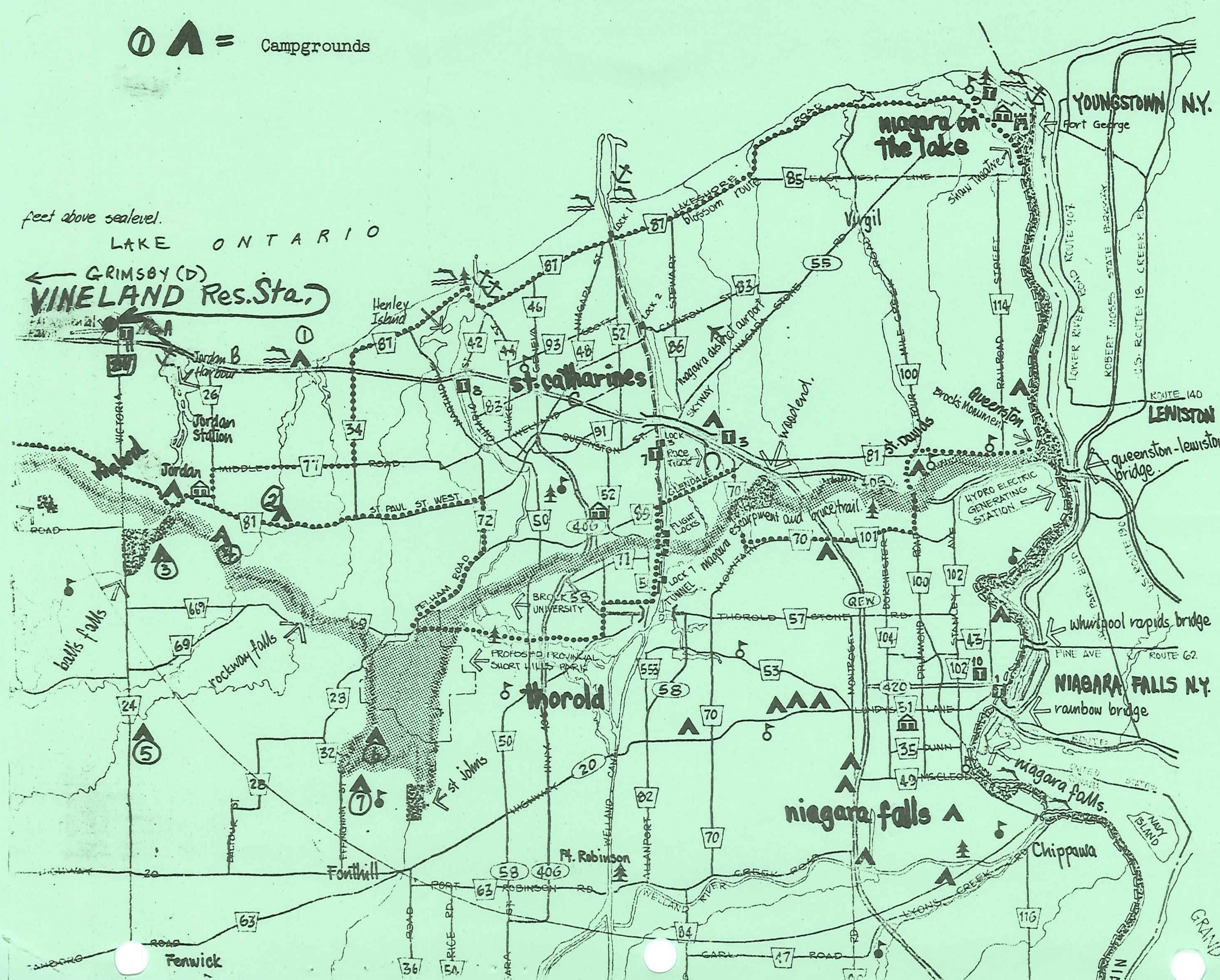
MOTELS	Rates/day*
Prudhomme's Garden Centre on Prudhomme Blvd. Box 187 Vineland Station, Ontario LOR 2EO	18/20 single 24/30 double
Beacon Motor Hotel (AAA, CMA) On Lake Ontario Box 70 Jordan Station, Ontario LOR 1SO (416/562-4155)	20/26 single 25/31 double
Highway Motor Inn (DAA) 420 Ontario Street St. Catharines, Ontario L2N 4G9 (416/688-1646)	17/23 single 20/33 double
Holiday Inn (AAA) 2 North Service Road St. Catharines, Ontario L2N 4G9 (416/934-2561)	21/28 single 28/41 double
Hotel Esquire (AAA) 99 Queenston Street St. Catharines, Ontario L2R 2Z2	12/15 single 18/22 double
Howard Johnson's Motor Lodge (AAA, DAA) on Lake Street St. Catharines, Ontario L2N 3Z7 (416/682-4343	19/24 single 24/36 double
Junction Hotel (OMA) 518 Queenston Street R.R. #4 St. Catharines, Ontario L2R 6R1 (416/682-4343)	12/16 single 16/22 double
Kirkwood Motel (OMA) 239 St. Paul Street West St. Catharines, Ontario L2S 2E4 (4k6/685-4892)	12/16 single 16/22 double
Leonard Hotel & Motor Inn 259 St. Paul Street St. Catharines, Ontario L2R 3M7	16/21 single 20/35 double

*Motel rates quoted are 1976 prices and there may be increases.
Make your own reservations by contacting your choice by card or phone.
See map for location of these lodging accomodations.

Parkway Inn (AAA, DAA) Casablanca Blvd. R.R. #2 Grimsby, Ontario L3N 4E8 (416/688-2324)	20/32 single 25/37 double
Casablanca Motor Hotel (OMA, DAA) Casablanca Blvd. R.R. #2 Grimsby, Ontario L3N 4E8 (416/945-2278)	13/18 single 18/26 double

CAMPGROUNDS	Facilities
Charles Daley Park 6 miles west of Q.E.W. St. Catharines, Ontario (416/934-3200)	FT, SH
Big Valley 4 miles west Regional Road #81 St. Catharines, Ontario (416/562-5616)	FT, SH, E, W
Balls Falls Conservation 1 mile south of Townline Road Vineland, Ontario (416/892-2621)	
Shangri La Valley 17th Street South St. Catharines, Ontario	FT, SH, E, W
Lake'N Trees 7 miles south on Regional Road 24 Vineland, Ontario (416/892-5622)	FT, SH, E, W
Effingham Valley 3 miles northwest on Effingham Road Fonthill, Ontario	FT, SH, E
Bissells Hidaway (Crazy Horse) 3 miles northwest on Effingham Road Fonthill, Ontario (416/892-3864)	FT, SH, E, W

CODE: E-Electrical, W-Water, S-Sewers, FT-Flush Tpilets, SH-Showers


① ▲ = Campgrounds
feet above sealevel.
LAKE ONTARIO
← GRIMSBY (D)
VINELAND Res. Sta.
Jordan B Harbour
Jordan Station
Jordan
Henley Island
St. Catharines
niagara district airport
blossom route
LAKESHORE
Virgil
niagara on the lake
Shaw Theatre
Fort George
YOUNGSTOWN N.Y.
Queenston
Brocks Monument
LEWISTON N.Y.
queenston-lewiston bridge
HYDRO ELECTRIC GENERATING STATION
St. Davids
woodend.
niagara escarpment and bruce trail.
SKYWAY
Race Track
GLENDALE
FLIGHT LOCKS
LOCK 1
LOCK 2
LOCK 3
TUNNEL
BROCK UNIVERSITY
PROPOSED PROVINCIAL SHORT HILLS PARK
thorold
st johns
rockway falls
ball's falls
Fonthill
Pt. Robinson
Fenwick
niagara falls
niagara falls.
Chippawa
whirlpool rapids bridge
NIAGARA FALLS N.Y.
rainbow bridge
NAVY ISLAND
GRAND
VICTORIA
MIDDLE ROAD
ST PAUL ST WEST
PELHAM ROAD
QUEENSTON ST.
WELLAND
THOROLD STONE RD.
MONTROSE
DORCHESTER
DRUMMOND
STANLEY AVE
LUNDYS LANE
DUNN
MC CLEOD
PINE AVE
ROUTE 62
LOWER RIVER ROAD ROUTE 407
ROBERT MOSES STATE PARKWAY
U.S. ROUTE 18 CREEK RD
U.S. ROUTE 190
ROUTE 140
PARK BLVD
RAILROAD STREET
FOUR MILE CREEK ROAD
EAST WEST LINE
NIAGARA STONE RD
CARLTON ST
STEWART
MARTINDALE
ONTARIO
LAKE
GENEVA
NIAGARA ST
WELLAND RIVER
LYONS CREEK RD
CREEK ROAD
WELLAND CANAL
ALLANPORT
PORT ROBINSON RD.
RICE RD.
BALFOUR ST
HIGHWAY 20
CARL ROAD
QEW

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PATTERNS OF ROOTSTOCK PERFORMANCE

Variables. Performance of different rootstocks can vary from country to country, state to state, fruit area to fruit area, and from site to site on the farm. Some of the reasons, or causes, for these variables are: soil differences, climate conditions, and overall tree management. Not a great deal can be done about soil and climate variations, but tree management can be changed from bad to excellent or visa versa.

The Rootstock. Obviously, each stock has a certain growth pattern, but conditions under which that stock is grown can cause that pattern to be either accentuated, remain the same, or lost. For example, a scion variety on M.9 grown under a moderate climate and a deep, well-drained loam soil will, at maturity, be approximately twice as large as the same combination grown under a more adverse climate and shallow non-fertile soil. Similarily, trees on the semi-vigorous stocks such as MM 106 and MM 111 grown under favorable conditions may become as large as those on seedling rootstocks.

The Variety. The variety has a pronounced influence on rootstock performance. This can be observed in root extension growth of nursery trees. For example, a vigorous variety such as 'Mutsu' on M.7 and 'Jonathan' on M.7, when dug as one-year-old trees, the former combination (Mutsu on M.7) will have a larger rootsystem than the latter. This trend follows in all varieties according to their natural degrees of vigour. It will also continue throughout the life of a particular scion/stock combination.

Nutrition. The growth and performance of a scion on a certain stock is greatly influenced by nutrition. Some soils will retain the nutritional elements better than others, thus providing more uniform absorption by the roots. If, for example, soils are low in iron and/or magnesium, shoot growth is reduced. Rootstocks will vary in their capabilities to take up various nutrients from the soil. Much is yet to be studied about nutrient responses of various graft combinations.

Water: Apple rootstocks are classical examples of varied response to soil water. Some of this is due to inherent physiological differences, and probably more so due to gross root morphological variation from one to another stock. That is to say, some have a top root extending deep where more soil water is available; others may have a shallow spreading rootsystem drawing moisture

from a large area and some have restricted roots needing repeated rain or supplementary irrigation. Moisture capacity of soils plays a role in holding adequate water for the varied rootsystems.

External factors. The varied insects and diseases that plague both tops and roots of trees can have a pronounced effect on growth and yield. Resistance of roots to the numerous pathogenic fungi is essential for tree life longevity. The currently used rootstocks certainly vary in this tolerance to soil born organisms. MM 106 lacks this tolerance whereas M.7 is more tolerant. The reverse is true in resistance to wooly aphids; MM 106 is resistant, whereas M.7 is not.

Summation. The pattern of performance of most fruit tree rootstock varies, because they may falter in one or more of the good characteristics. So, in developing new rootstocks for fruit trees, a number of performance characteristics must be checked. The favorable factors are many and should be kept, whereas undesirable features must be eliminated before they reach full scale orchard tests. This takes time, but the rootstock research projects are well underway. Have faith!

'FUJI' AND 'AKANE' APPLE VARIETIES

While in Japan during July, we had a chance to see the 'Fuji' and 'Akane' in production. The 'Fuji' is rapidly gaining popularity, mainly because of good size, red color, good culinary use and keeping quality. 'Fuji' is the result of a cross of 'Ralls Janet' x 'Delicious'. It is a late maturing apple--end of October to the first week in November. Skin is thick and smooth, and the flesh is firm.

'Akane' came from a Jonathan x Worcester Pearmain cross made in 1939 at Fujisaki in the Aomori Prefecture. The fruit matures in the McIntosh season, has tough skin, white flesh, crisp, subacid with Jonathan flavor and good storage quality. The tree is dwarfish and rather weak growing.

ROOTSTOCKS USED FOR APPLE IN JAPAN

Until recently, the rootstocks used in Japan have been seedlings of Malus sieboldii and M. fruitifolia, as well as other apple seedlings. The first two show some dwarfing tendencies and are quite precocious and uniform. A dwarf clone selection from M. fruitifolia is now being increased, and it exhibits future possibilities.

Some of the fruit areas in Northern and West Central Prefectures in Japan now have a good start with the M and MM rootstock series from England. Excellent test plantings were observed in Aomori, Iwate, Fukushima, Nagano and Yamanashi Prefectures.

PEACH TREE LONGEVITY IN JAPAN

Most of the peach varieties were clingstone white fleshed. Trees up to 20 or 25-years-old were still in good health and productive. Yield were recorded as high as 40 tons per hectar (17.8 tons per acre). 'Akubo' variety was one of several grown in the Nagano Prefectures. Trees were trained to a rather

flat top and spaced approximately 20 x 25 feet. Most of the peach fruit, as well as the apple fruit, was covered with paper bags in order to have better finished fruit and less exposure to spray residue.

One grower we visited had 1/2 hectar peaches and 3.6 hectar apples (40% 'Fuji', 30% 'Delicious' and 30% other fruit varieties). That was a relatively large and well-managed fruit farm.

CHINA (PRC) AND ITS' FRUITS

In general, fruit production on the mainland lags behind that of vegetable production. That is, fewer fruit productions than vegetables were seen growing in the countryside and marketed in the cities. The agricultural communes that we visited had some apple and peach orchards as well as grape plantings.

The Horticulture Research Station west of Sian was the most progressive. Here, they showed us rootstock propagation studies using Quince rootstocks for pear varieties and M. fruitifolia seedlings and M.7 for rootstocks. One of these test plantings apparently was mixed up in trueness to name because of variation observed in tree size and fruiting.

In one commune near Peking, we observed an apple orchard in fruit. Some of the disorders there were: apple cedar rust, fire blight, and iron deficiency as well as some chlorosis caused by virus. In another area near Changchow, we saw a variety named 'Red Star' which had 'Delicious' similarities.

We were told that conditions in PRC have improved since 1949. Considering certain handicaps such as lack of equipment, self-owned land, know-how, and, most of all, incentive, etc., agriculture there is improving, but by our standards, it has a long way to go.

Interesting facts. The Yellow River "dumps" daily millions of tons of rich soil into the East China Sea.

Precipitation will vary from 12 cm in Central China to 200 cm in some southern areas.

About 11% of the land is in cultivation, 28% pasture, 10% forest, and 51% mountains and wasteland.

Birth control is regulated at 2 children per couple, but population is increasing and approaching one billion.

An agricultural or industrial commune employs up to 10,000 men and women.

Semi-tropical and tropical fruit such as citrus, banana, olives, lychee, etc. are grown in the Kwangtung province.

Longevity is due to hard work when young, continuous hard work, vegetarian diet, no "bad" habits, and few children.

DATES OF MEETINGS AND ORCHARD STUDY TOURS

Dec. 6-8:	Michigan Horticultural Society - Pantlind Hotel, Grand Rapids
March 1-3, 1978:	International Dwarf Fruit Tree Association - 21st Annual Conference
June 19-21, 1978:	Tentative dates of IDFTA Summer Orchard Tour, New England States
July 1-16, 1978:	Tentative dates of IDFTA sponsored tour to fruit areas and research stations in Poland, Holland and England
July 16-20, 1978:	American Society for Horticultural Science Meetings - Sheraton Hotel, Boston, Massachusetts

WHAT ROOTSTOCK FOR DELICIOUS?

The Delicious, with all its problems, is a hot topic for discussion these days. Pomologists and growers are well aware that 'Delicious' is the most tender variety now grown. That seems to hold for all the spurs and strains that have been introduced in recent years. Orchard site selection is one factor which could improve production. Selection of the most compatible and precocious rootstock will also help.

'Delicious' spurs and strains are difficult to grow on M.9. The combination is precocious, but it is not easy to establish a production surface unless 800 to 1,000 trees are set per acre of the spur trees. Some sort of tree support system is needed when M.9 is used. M.9 will do best on a deep loam soil, and poorly on a shallow sandy loam. Trickle irrigation will improve bearing surface of spur type 'Delicious'/M.9.

Malling 26 is suitable for a wider range of soils and can be managed as a free standing tree with spur 'Delicious' (most 'Delicious' now are spur types and very few "standard" 'Delicious' are planted). Precocity of M.26 is good and with 300 trees per acre (8' x 18'), production per acre could equal or surpass that of 'Delicious'/M.9.

Malling 7 has a good record of production on the better fruit sites in Michigan, especially suited for the spur 'Delicious'. This combination comes into bearing at an early age, and this is an aid in early spreading of branches. Both M.26 and M.7 used under 'Delicious' make rather open spreading trees for better light exposure and stronger spur development and easy tree management.

Malling Merton 106 also has its faults, but it is very precocious with all varieties, including 'Delicious', that we have tested. On an average orchard site, it will need more room to grow, about 172 trees per acre (14' x 18'). MM 106 is well known to be susceptible to "collar rot" on the heavier, not so well drained soils, so it should be used only on the best sites and soils.