

Minnesota Nurserymen's newsletter

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THE MALLING ROOTSTOCKS FOR APPLES¹

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Anyone who has seen the commercial orchards of England cannot help but be impressed with the use being made of the Malling rootstocks to alter the bearing habits of varieties, and to develop orchards that are easier to care for than those containing standard types of trees. This is a summary of the latest information about these rootstocks.

Perhaps the most impressive difference is in earliness in coming into commercial production. This factor may be found to offset the present high cost, in this country, of establishing an orchard on Malling rootstocks. Earliness is in proportion to the degree of dwarfing. Another difference is that the fruit of most varieties ripens a week to 10 days earlier than the same variety on standard stock.

Most of the Malling rootstocks originated as selections from the old French Doucin or Paradise stock. Malling IX is reported to be a chance seedling found in France about 1879. These rootstocks were selected and propagated at the East Malling Research Station, England.

The prevailing opinion in Minnesota has been that these rootstocks are not hardy here. This feeling probably stemmed from a test orchard rootgrafted on Paradise stock that was planted at University Farm nearly 50 years ago. This planting failed and was discarded about 1922. However, according to Dr. W.G. Brierley, there was no clear-cut evidence of lack of cold resistance. Drought and a poor planting site probably had much to do with the failure of this orchard.

A test planting was established at the Minnesota Fruit Breeding Farm in 1956 using several of the Malling stocks and Clark Dwarf as interstems. No test planting has been started there using the Malling series as rootstocks, although both Dr. Snyder and Ted Weir have had one tree each of Cortland on Malling IX rootstock for the past five years. The trees started to fruit at three years of age and are doing nicely. Plantings of dwarf trees about eight to ten years old are reported near Alexandria and Red Wing but definite information about these plantings is not available. The latest and most extensive test in Minnesota has been started by Gordon Yates at La Crescent, who has an excellent collection of the most promising of the Malling stocks

and also the Clark Dwarf.

Not all dwarf stocks - Although tree performance varies to a certain extent with the scion variety used, the Malling rootstocks can be divided into four distinct groups with respect to the size of the propagated tree at maturity. These groups, together with the approximate height at maturity and the most widely planted rootstocks in each group, are shown below:

Extreme dwarf (5-6 ft.)	- Malling IX
Semi-dwarf (10-12 ft.)	- Malling VII
Semi-standard (12-16 ft.)	- Malling I, II, XI
Substandard (18-20 ft.)	- Malling XII, XVI

Dwarf types brittle and poorly anchored - A high percentage of bark in the roots is characteristic of the dwarfing habit. Such rootstocks generally possess brittle roots with poor anchorage. This is true particularly of the well-known and very dwarf rootstock Malling IX. Trees on this rootstock must be staked throughout their entire life. Experience in England indicates that most of the other rootstocks must be staked during the first few years in the orchard.

Dwarfing effect largely in the roots - Research in England has shown that the roots affect dwarfing much more than the stems. According to their data, scions inserted above the roots have only one-sixth to one-tenth the dwarfing effect of vegetatively propagated rootstocks. See J. Hort. Sc., April 1956, for the research data. When an interstem is used, it appears that usually there is, in addition to the stem effect, some additional dwarfing effect attributable to the graft union. It will take some time to evaluate the use of the widely heralded interstems from dwarfing stocks instead of the rootstocks themselves. It should be remembered that scion rooting of trees propagated on Malling rootstocks is undesirable, so this must be taken into account when deciding on planting depth.

Much to be learned - Many years of testing will be needed to learn whether these Malling rootstocks can be used to advantage in Minnesota. For example, there is the question of winter survival, the stability of the trees with respect to root anchorage, the best planting distances, the effect of the various rootstocks on color and storage behavior of the fruit, and the productive life of the trees. How much can we depend on methods developed in England where growing conditions are so different?

Test plantings have been made in a number of states. For example, the New York Station began a series of studies with dwarfing stock over 30 years ago. These plantings appear to indicate the answers to some of the other questions that must be answered.

¹Minnesota Fruit Growers Association Newsletter
4-5 February 11 and 12, 1957.

They show little or no evidence of incompatibility between any of the rootstocks and scion varieties. In general, the Malling rootstocks appear to be adaptable to a wide range of soil types. Weak-growing scion varieties appear to do better on the stronger growing rootstocks, while the stronger growing scion varieties do better on the more dwarf stocks.

Some additional information has been received about the behavior of Malling rootstocks used on trees exposed to low temperatures. L. L. Van Roehoudt, Okanagan Centre, Washington, reports that Malling IX was not injured in 1950 by 22 degrees below zero at the Summerland Station, British Columbia, with only a light snow cover. In Vernon, nearby, McIntosh on Malling I survived 35 degrees below zero without any root damage. Mr. Van Roehoudt reports that his Red Delicious yielded about one box per tree after the fourth year; Golden Delicious yielded one box after the third year. These trees, on Malling IX, were trellised on wire and planted four feet apart in the row, with rows 10 to 12 feet apart. He reports that most of the plantings being made on Malling rootstocks in that area, presumably for commercial trial, are being made on Malling II.

Haydn S. Pearson of Greenfield, New Hampshire, reports in "Horticulture" September 1956, that many home gardeners who have bought trees simply labelled "dwarf" have been, and will continue to be, disappointed. One should always order by rootstock number, he said. He uses three steel fence posts for staking each of his Malling IX. He plants Malling IX at 10 to 12 feet apart, Malling VII from 15 to 20 feet apart, and Malling II at 25 by 25 feet. His preference is Malling VII for the home garden if space permits. Other sources indicate that Malling IV has many good features but root anchorage is weak and the trees need staking.

We must not forget that the advantages we seek in uniformity can work the other way too, should certain types of trouble develop in the root system. If one tree is susceptible, all others on the same rootstock are likely to be affected. At present our trees are on seedling rootstocks, having varying degrees of resistance.

Most popular Malling rootstocks - It is estimated that about 80 per cent of the commercial orchards in England under 25 years of age are on Malling II. It is often used for home plantings. The standard planting distance is about 24 x 24 ft., or about 75 trees per acre. A young orchard was seen at the East Malling Station planted at this distance with fillers of Malling VII at 12 x 12 ft. and semi-permanents at 17 x 17 ft. Trees about 35 years old on Malling II were about 15 ft. tall. A 12-ft. ladder is tall enough for trees on this rootstock. M II has been reported a little difficult to transplant, so extra care would be advisable at planting time.

Malling XI, which is similar in size to M II, is most widely used on the continent because it is the hardiest of the Malling stocks. Dr. Rogers, at the East Malling Station, told me last spring that M XI might be the most promising rootstock for Minnesota. They do not need the hardiness of M XI in England.

Malling I makes a tree somewhat larger than Malling II but still within the same size classification. Malling

I is reported to have shown promise in test plantings in America.

Malling VII is coming into wider use in England as semi-dwarf rootstock, especially for the home garden or as a filler in commercial orchards. It is not as hardy as M II. Both M II and M VII have medium root anchorage. The latter is subject to crown gall. Trees on this stock will produce from 5 to 9 bushels of fruit per tree, and about 116 trees are planted per acre. Weak-growing scion varieties are planted closer together than the stronger growing ones.

Malling IX, the very dwarf rootstock, is planted about 8 x 12 ft. It has a very shallow and brittle root system, and is reported to do best where soil temperatures do not exceed 60°F. For this reason, mulching may be desirable in our warm, mid-continental climate. Malling IX is not widely used in commercial orchards in England. The early bearing of dwarf stocks may be illustrated by records from the Vine-land Station, Ontario, where Malling IX has been growing for the past 18 years. The accumulated yield over the first 17 years is reported at 2,329 bushels of McIntosh while the comparable yield from standard trees was 646 bushels. The dwarf trees are trained to a 4-wire trellis.

Malling XVI produces a tree that is substandard in size, perhaps comparable to our Haralson variety. It tends to grow late in the fall and probably is not worth trying in Minnesota according to Dr. Rogers.

Malling XII produces trees that are not much smaller than standard apple trees. It is reported to have had rather poor winter survival in some test plantings in this country.

In Holland, 80 per cent of the new plantings are on Malling IX, IV, and VII. Branches are trained in a horizontal position to form a bush or "vrije spil".

Malling-Merton rootstocks - These rootstocks were bred for resistance to woolly aphid jointly by the East Malling Research Station and the John Innes Horticultural Institute at Merton. The resistance to woolly aphid is confined to the rootstock and is not transmitted to the scion variety. According to Dr. Rogers, MM 104 and MM 106 may be the most promising of this series. MM 104 produces trees that are larger than M VII, and with much better root anchorage. Trees on MM 106 are semi-dwarf in size, about the same as M VII when growing in good soil.

How does Clark Dwarf differ? - It has been identified as one of the Paradise types, and several research workers have found Clark Dwarf to be similar to Malling VIII. The system of propagation is different from that used for the Malling stocks. Instead of using dwarfing rootstocks, a hardy understock is grafted onto a standard seedling rootstock. Then an interstem of Clark Dwarf is inserted, and finally the desired scion variety. The general experience here with this system is that a considerable enlargement in diameter develops at the interstem. What effect, if any, this will have on the structural strength in later years of trees of the various scion varieties in this area is not known. The wood of Clark Dwarf is extremely brittle. Clark-dwarfed trees have produced 4 to 5 bushels of fruit when five years old. Experience in Iowa indicates that the trees should be planted 12 to 16 feet apart in

the row, with rows 20 to 24 feet apart. The trees at maturity will be considerably larger than those on Malling IX, as indicated by the planting distance recommended in Iowa. Others suggest planting Clark to 12 ft. apart.

Other dwarf rootstocks include Alnarp 2 from Sweden and the new apomictic seedling stocks from Canada. The latter have not shown much promise. Also new are the M IX crosses.

Availability of Malling stocks - Trees on Malling rootstocks are available from a limited number of nurseries in this country, such as Hill Top Orchards and Nurseries, Hartford, Michigan, and the Henry Leuthardt Nursery, Port Chester, New York.



NOTES TO THE NURSERYMEN

Walter P. Trampe
Supervisor, Section of Nursery Inspection
Minnesota Department of Agriculture

WINTER INJURY

Nurserymen in all parts of the State are reporting serious damage to evergreens. Preliminary reports indicate that plants not fully established show evidence of the most serious injury. Strawberry plants also appear to have suffered extensive damage.

Staff members in the Department of Horticulture, Department of Plant Pathology of the University and also from the Dept. of Agriculture are making a survey to determine the extent of the damage. The results will be valuable for a permanent record if such a survey can be continued on an annual basis.

SPRING DEALER INSPECTIONS

Fewer than one-half of the spring dealer inspections have been made at the time of this writing. Approximately 1000 rose bushes have been condemned to date. It is interesting to note that the firm which was the source of our most serious trouble last year has improved the condition of its stock to such an extent that their problem appears to be solved for the current season.

INSECT CONTROL

Unseasonably warm weather should serve as a warning to nurserymen to be especially watchful for evidence of insect and mite activity.

Spruce needle miner

Spruce trees should be examined for evidence of needle miner. Needles webbed together are the first indication of infestation. Larvae should now be active, if they are present, at this time. Spray with 2 pts. 50% malathion per 100 gallons of water or 2 tps per gallon of water.

Mites

Arbor vitae, spruce and juniper should be checked early this season for mites. Ovex (Ovotran) 2 lbs.

50% wettable powder per 100 gallons water or 2 tbs per gallon of water is the usual dosage. Malathion at 1/2 the dosage suggested above, will speed action of the ovex.

Strawberry plants, especially those bearing fruit, are extremely susceptible to two-spotted mite injury. Check the undersides of leaves for active mites and eggs. Ovex is no longer approved for use on fruiting plants before harvest. Kelthane may be used in early bloom. It is effective on two-spotted mites and cyclamen mites. Aramite and Dimite are also effective on two-spotted mites. Either of the latter may be used at the early bloom stage.

TREE - BALLER

The writer observed a demonstration of a simple tree baller that appears to have considerable promise. The inventor is one of our St. Paul nurserymen. This baller is a very simple device made in two halves. Each half is driven into the soil with a plunger-type driver. One-half locks into the other half as it reaches the desired depth. Two men lift the ball from the hole in a simple, twisting motion. The ball is then placed in a veneer shell which is tied around the ball. The shell replaces the usual burlap wrapping. According to the inventor, the veneer binding speeds the entire operation greatly.

BARBERRY SHIPPING PERMITS

R. O. Bulger, Regional Supervisor, Agriculture Research Service, reminds us that anyone who desires to ship species of *Berberis*, *Mahoberberis* or *Mahonia* interstate during the shipping season beginning October 1, 1957, should apply for inspection at once. Write to the Agriculture Research Service, 35 South Fifth Street, Minneapolis, Minnesota.



THE MODERN LYTHRUMS

H. F. Harp
Canada Experimental Farm,
Morden, Manitoba, Canada

The three Lythrums developed at the Experimental Farm, Morden, have lately been the subject of much colorful and widespread magazine advertising. A description and appraisal of these plants is timely and should serve a useful purpose.

Morden Pink originated as a male-sterile mutant of *L. virgatum*. It grows to about 4 feet high bearing a profusion of graceful, pure-pink spikes from early July until September. The varieties Morden Gleam and Morden Rose were developed by crossing Morden Pink with select forms of the native *Lythrum alatum*. Both varieties are superior in color to the mother parent but they tend to heavy seed production which shortens somewhat their season of bloom.

Morden Gleam - The vigorous plant grows to four and a half feet, is spreading and bears the largest spikes seen in any of the Lythrums. The color is deep rosy-pink, fading slightly in hot weather. Many side branches produced from the main stems prolong the season of bloom and give, to the plant,

a graceful appearance.

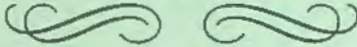
Morden Rose - This variety is more compact than either Morden Gleam or Morden Pink. The foliage is broad, abundant, dark green and glossy. The flowering season is a week or so later than any of the Lythrums tested at Morden; the color, considered the brightest yet seen in Lythrums, is a rich rose-red, durable through periods of heat and drought.

All three varieties are obtainable from prairie nurserymen at reasonable prices and home-owners will be well advised to patronize these reputable firms rather than be led away by the colorful and often exaggerated claims made in some magazine advertisements.

Several European varieties have been on test at Morden including Brightness, Rose Queen, Perry's Variety, Lady Sachville and Mr. Robert; the last named is well recommended but none is superior to the Morden varieties. Most of the European introductions are less thrifty, somewhat dull in color and of shorter blooming period.

A welcome companion plant is Dropmore Purple, raised by Dr. F. L. Skinner of Dropmore, Manitoba. The long sprays of purple flowers are freely produced from July until September.

Plants are increased readily by means of soft-wood cuttings. Seed from open pollinated plants produce a diversity of poor colors.



Editors Comments
R. J. Stadtherr

DWARF FRUIT TREES

During my Eastern trip last summer, I had the pleasure of meeting Dr. Karl Sax, Harvard University, at the Arnold Arboretum, Boston, Massachusetts. He showed me many examples of dwarf apple, plum, peach and pear trees which he developed there. Dwarfing was obtained by grafting on to special stock, girdling or bark inversion.

Inverting the bark of young apple trees from 3 to 5 years old effectively dwarfed the trees. In mid-June a 2-inch ring of bark was removed from the trunk, inverted, and bound tightly with a rubber tape. After about 10 days a union was made and the tape could be removed. Such trees would bear 1 or 2 years after the inversion was made. It was not recommended for plums or peaches because they tend to bleed.

Dwarfing by girdling was obtained by tying a knot in the ships when they were still pliable, early in the season before wood tended to harden. This practice could be done early during the growing season, a year after the stock was budded. An interstock of *Malus sargentii*, which has a very willowy new growth, was preferred over named varieties which often have a more brittle growth which breaks when bent.


Dr. Sax had many dwarf specimens which were

obtained by grafting on to different understocks. Malling IX understock for apples has been used frequently by nurserymen to obtain dwarf apple trees. Malling VII understocks will give semi-dwarf trees. Pears were dwarfed by using flowering quince or cotoneaster. Since cotoneaster is difficult to transplant, cotoneaster was budded on hawthorn then pear was budded onto the cotoneaster. For peach and plum varieties, Dr. Sax used *Prunus besseyi* (Western Sand Cherry) or *Prunus tomentosa* (Nanking Cherry). He said that peach would often bear when only two years old when budded onto Nanking cherry seedlings.

Japanese flowering quince on apple, flowering almond on Nanking cherry, cotoneaster on hawthorn, common lilac on tree lilac, and red maple on silver maple were other trees which he had developed by budding. Red maple on silver maple understocks tended to show better fall color annually and would tolerate more alkaline soils than red maple roots. The grafted red on silver maple tended to give dwarfed trees.

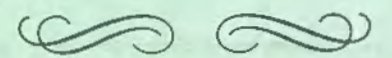
Fruit trees which are dwarfed tend to bear earlier and are more easy to prune, spray and pick. Most of the trees seemed to be very sturdy, however, in some cases the stock out-grew the understock or the tree would overcome the girdling affect when they grew older.

I can assure you that the peaches were as good as any I've had. The trees require the same growing conditions as the other trees. Dr. Sax said that the trees were fertilized in early spring and again in early summer. The trees were cultivated until they began bearing.



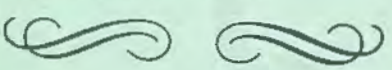
CRABGRASS IS COMING

Remember, early to mid-June is the best time to treat the lawn to control crabgrass. Crabgrass seeds usually germinate at this time in the Twin Cities area. The two old standbys, phenyl mercuric acetate and potassium cyanate, have given the best control in five year tests.



WINTER INJURY

Please fill out and return the questionnaire sent to you by T. L. Aamodt, Director and State Entomologist, Division of Plant Industry, State Department of Agriculture, Dairy and Food.



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