MALUS

International Ornamental Crabapple Society Bulletin

Fall 1991 Vol. 5 No. 2

MALUS
is the official publication of the International Ornamental Crabapple Society.
Volume 5, Number 2, Published twice-annually

MALUS

INTERNATIONAL ORNAMENTAL CRABAPPLE SOCIETY BULLETIN

Fall 1991 **Volume 5, Number 2**

CONTENTS

Letters to the Editor 1
Zumarang/Zumirang 3
Elucidation of Crabapple Lineage by Direct Examination of rDNA Sequence 4
Apple Scab 6
Crabapple Database 7
Crabs You Should Know: *Malus baccata* 'Walters' 12
Evaluation of Ornamental Crabapples at the Longenecker Gardens 13
Malus Obscurus 16
90% Worm-free Crabapples Using These No-spray Methods 20
Kelsey Crabapple 21
Virus Elimination and Certification of Crabapples 22
Help Needed on Information for Database 22

MALUS
is published by
Plantsman's Publications
P.O. Box 1, Flossmoor, IL 60422-0001
(708) 747-1900

MALUS is published two times a year by the International Ornamental Crabapple Society, a nonprofit organization. Dues payments, inquiries about membership, requests for copies of the bylaws, orders for back issues should be sent to: Dr Tom Green, Morton Arboretum, Hwy 53, Lisle, IL 60532 USA (708-719-2414) FAX (708-719-2433).

Annual Membership Dues: Individual, Commercial (or Corporate), Organizational - $20.00; Student - $10.00; Sponsorship $200.00; Life (individuals only) - $250.00

Editorial contributions and inquiries about published articles and any requirements should be sent to the editor or executive director.

LETTERS TO THE EDITOR

The following letter sent to me is being printed as it was received. Considering Mr. Viikholm is from Estonia, now a free nation, his English is not perfect, but he is able to get his message across. I did not correct his English. TLG.

Dear Mr. T. L. Green:

Sorry for so tardiness answer, but your letter circulated between Estonia gardeners almost the year. The point is, that here are not the crabapple collectors. Up till now, by the Soviet laws, people had had the land only 0.06 ha in cities and 0.15-0.25 ha in country. There were no place to collect the trees. Now seems the times are changing, here may be farmers and other private landowners.

I am engaged in ornamentals in Tallinn Botanical Garden. In the same time I am building up a small private nursery of ornamentals, where the crabapples will have their place too. Genus MALUS is represented in the dendrology collection of Tallinn Botanical Garden as follows:

Malus baccata (L.) Borkh.
M. baccata var. *mandshurica* (Maxim.) Schneid.
M. sargentii Rehd.
M. x purpurea (Barbier) Rehd.
M. x purpurea "Eleyi"
M. sieversii (Ledeb.) M.I.Roem.
M. transitoria (Batal.) Schneid.

In addition in 1990 I have grafted for the botanical garden (and for myself) some crabapples, what we got from Latvijan Botanical Garden in Salaspilsi, like 'John Downie', 'Nicoline', 'Hillieri' and 'Royalty' from Alsotekeres in Hungary. I do not know yet, how they will like our conditions. The "Dolgo" and less the weeping "Elise Rathke" are in Estonia everywhere. By my information from year 1987 in the Baltic states and Moscow there were next cultivars of *MALUS*:

Malus baccata 'Pendula'
M. prunifolia 'Fastigiata Bifera'
M. x purpurea 'Aldenhamensis','Lemoinei', 'Eleyi',

M. sieversii 'Niedzwetzkyana'
M. 'Elise Rathke', 'Echtermeyer', 'Umbraculifera', 'Rubrifolia Pendula', 'Moerlandsii', 'Royalty','Makamik' 'Economeara Tiel'{'Exzellenz Tiel'?}

I cannot give guaranteed that all they are true names. Like you see, here is too few for article, but it does not mean that we are not interested in information about crabapples. Sorry that there are no possibility to get graft-scions from you. I hope, you will excuse my mistakes in English. Let me hear from you.
With kindest regards,

Peeter Viikholm
Sompa tee 8
Tallinn 200019
ESTONIA

Dear Mr. Green:

I am presently compiling an account on the species and hybrids of Malus for the publication, European Garden Flora. It will come as no surprise to you that I am having some difficulty in trying to find a stable nomenclature to follow. I wonder if you would be so kind as to help me in this matter. For instance, do you have an up-to-date list of the species and hybrids which are currently growing in cultivation (in N. America and Europe)? I do, in fact, have many up-to-date accounts to follow but they do seem to contradict each other on some of the more critical groups.

I would be most grateful for any help you could offer me with this matter.

Yours sincerely,

Martin F. Gardner
Holly Grove Cottage
Windsor, Berkshire SL4 2BU UK

John den Boer responds:

Work is under way at this moment to determine the crabapples that are available commercially. Also at the same time the members of the Board of Directors are reviewing a complete list of crabapples to determine to the best of our joint abilities the correct common name and botanical names of all these crabapples. This work is expected to be completed before the end of this year. As soon as this has been completed I will send the result to you.

'ZUMARANG' / 'ZUMIRANG'

It has been noted that there were two spellings for the above crabapple. 'Zumirang' is being used in nursery catalogs and in some correspondence. 'Zumarang' is used at such places as the Morton Arboretum. Mr. Les Demaline, President of Willoway Nurseries, Inc., has clarified the spelling in a letter to this editor.

> The *Malus* 'Zumarang' (TM) was a selected seedling from the *Malus* selection 'Zumi Calocarpa'. The seed from a selected 'Zumi Calocarpa' seedling was selected in 1978 by me. After six years of carefully studying the vigor, flower, foliage and disease resistance, the selection *Malus* 'Zumarang' (TM) came about.
>
> The *Malus* 'Zumarang' (TM) has extremely bright green foliage; the flowering habit is approximately early May with crystal clear white flowers. The deep red fruit, which is approximately 3/8" diameter in size, lasts every year until the birds pick them; which is approximately in mid-February.
>
> The name was selected by me. The seed source was 'Zumi Calocarpa' "Zuma", which brought to my mind the old slang saying "what goes around comes around"; and that saying reminded me of a Boomerang, hence the name *Malus* 'Zumarang' (TM).

Those nurseries who have been listing the crabapple as 'Zumirang' should review and correct their way of spelling this crabapple. [Editor].

ELUCIDATION OF CRABAPPLE LINEAGE BY DIRECT EXAMINATION OF rDNA SEQUENCES

Charles J. Simon and Norman F. Weeden
New York State Agricultural Experiment Station
Cornell University, Geneva, NY 14456

Classification of crabapple cultivars is often complex and uncertain. Many crab cultivars are the result of collections of wild propagation material. In many cases, precise records of the collection locations were not kept. Since *Malus* species are very diverse in appearance, and since different species often intercross, materials collected from the wild are often not easily classified to a certain species. This is especially true since such collections are usually selected for their unusual appearance. As a result, many cultivated crabapples are not ascribed to a certain species of *Malus*.

That the species identity of a certain cultivar is uncertain is often not an important matter. Precise lineage is usually only of academic interest. There are, however, a few situations where it is useful to know the precise taxonomic background of a particular cultivar. The crabapple breeder would want to know the pedigree of a crab he was using as a parent in a cross, for example. A second situation in which it is important to know the background of a particular crab is when the organism is the subject of a genetic study. This is the situation in which these authors found themselves in 1989.

We were conducting a study into a certain gene system in apple as part of a doctoral research project (Simon, 1989). One of the principal subjects of that study was the crabapple cultivar 'White Angel'. This cultivar was selected because it displays an interesting genetic condition relevant to the research project. In the course of preparing reports of this project, the author (Simon) was unable to find written records indicating the botanical origin, or even the probable origin of the 'White Angel' cultivar. Even after consulting the apple experts at the Geneva campus, Drs. R. D. Way, R. C. Lamb, and J. N. Cummins, as well as Dr. T. L. Green of the Morton Arboretum, we could only get speculations upon the genetic origin of 'White Angel'. At this point we were considering simply stating some of the speculation when referring to the origin of 'White Angel'.

One of the last experiments conducted for this project, however, unexpectedly offered an answer to the puzzle. We won't go into detail here on the technical aspects, although we invite interested readers to write the senior author for additional information. Suffice it to say that the project involved cloning an apple gene, and using the cloned gene to examine taxonomic diversity in the genus *Malus*.

Figure 1 shows the result of an experiment using this gene to analyze several *Malus* species. This particular technique is known as "Southern Analysis", and what it detects is the presence of certain DNA sequences. In this figure the lanes marked by the arrows contain DNA of *Malus sieboldii* and *M. sargentii*, respectively. The other lanes shown contain DNA from accessions of *M. baccata, M. hupehensis, M. halliana,* and *M. rockii*. The important result is that the bottom-most band in the figure is found only in *M. sieboldii* and *M. sargentii*. This band (and hence, DNA sequence) is also present in 'White Angel' DNA, as well as DNA from another crab variety called 'David'. All other species and varieties of Malus that we examined - over 88 specimens - lacked the band or gave different patterns when examined with this method. Figure 2 shows, from left to right, DNA from *M. sieboldii*, and from the crab varieties 'White Angel' and 'David', respectively, run in the same experiment. It is clear that the three have the same band pattern.

The DNA sequence identified as being unique to *M. sargentii, M. sieboldii* and the two crabs is inherited as a normal Mendelian gene. It is quite unlikely that the similarities in the restriction patterns of these accessions arose independently. We conclude that 'White Angel' and 'David' are probably derived from the same branch of the evolutionary tree, so to speak, as *M. sargentii* and *M. sieboldii*. There are, undoubtedly, other *Malus* accessions that also possess the same pattern, and the use of this technique could provide additional information about the relationships among crabapples and their wild relatives.

Reference cited: Simon, C. J. 1989. Molecular analysis and cloning of *Malus* ribosomal DNA. Ph.D. Thesis, Cornell University

Senior Author's address: USDA/ARS, 215 Johnson Hall, WSU, Pullman, WA 99164-6421

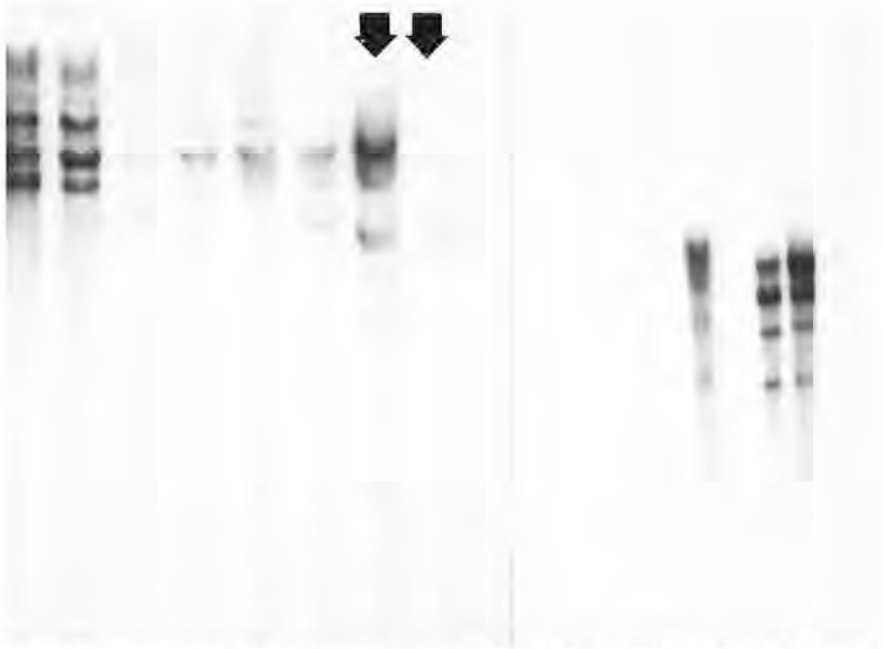


Figure 1. Comparison of DNA sequence bands of *Malus baccata, M. hupehensis, M. halliana,* and *M. rockii, M. sieboldii,* and *M. sargentii. M. sieboldii* and *M. sargentii* (marked by arrows) have a band near the bottom.

Figure 2. Comparison of DNA sequence bands of *Malus sieboldii,* and cultivars 'White Angel' and 'David'

Apple Scab

From the ***MOTHER EARTH NEWS*** comes the following information on a means for controlling apple scab:

An Indian horticulturist reports that spraying a 5% solution of urea, a soluble nitrogen fertilizer, on apple trees late in the growing season (but before leaf fall) can result in scab control comparable to that achieved by using fungicides. Synthetic ureas, made from petroleum, are chemically identical to the urea in the animal urine, so homemade manure tea may make a good (and non-oil-based) substitute.

CRABAPPLE DATABASE

John H. den Boer

Is there anyone who has not heard the statement: "I don't know what it is, but I can tell you what it isn't?" This is a real problem when trying to identify crabapples. Many are so similar that it is difficult to distinguish one from another.

How does one then go about identifying a crabapple? That's not easy. It is easy to distinguish a few from all others because certain characteristics are unique to them and not to others. Some crabapples have double flowers, others not. Some have purple leaves, others not. The type of flower and the color of leaves are just two out of more than one hundred characteristics that can be used to distinguish one crabapple from another.

The problem of identification of plants has been addressed for many years by the use of keys, mostly binomial, where the user is asked to determine the presence or absence of a specific characteristic and proceed to the next directed key accordingly. Charles Huckins created such a key for use in identifying crabapples. The use of such keys require the user, in most cases, to be able to respond correctly to each key, else he can go no further.

The normal mode of presenting descriptive information is through the printing of books. Printing is expensive, and such information becomes obsolete quickly. Another problem with printed data is that they are never complete. Information that is needed has to be gathered from many different sources. The second major problem in determining the characteristics of plants in question is the lack of information.

It was for these reasons that it was felt a different approach was needed for the collection and presentation of descriptive information on crabapples. Today, computers are being used very effectively to present and use information. Why not use the computer to handle information about crabapples? It has the capability of addressing most of the problems presented above. It has the advantage of being updated easily, the cost of making copies of computer data is much less than publication costs for books in the quantities required for projects of this nature, and it is useful to the user for making comparisons of data. Therefore, a database was created, and a computer program was written by the writer to enable the user to identify an unknown, or at least focus on a limited number of possibilities for an unknown based on the available information. What follows is a general description of the program that was written to use the information in the database. The computer program has the capability to do the following:

1. Identify unknown crabapples
2. Select crabapples having given characteristics
3. Provide descriptive information on any crabapple
4. List synonyms for each crabapple
5. List all names applied to crabapples and provide corresponding common names or botanical name
6. List names of all crabapples in database sequenced either by botanical names or by common names with corresponding common or botanical names and synonyms
7. Provide background on
   a. who developed or found the crabapple and when
   b. who introduced the crabapple and when
   c. who or what the crabapple was named after
   d. who named the crabapple
   e. identity of its parentage
   f. ploidy level
8. Provide information on aesthetics and resistances to diseases
9. Provide help on technical terms; including drawings of such things as the shapes of fruit, trees, and leaves
10. Provide forms for the collection of descriptive information

The program is menu driven. The user selects from the menu the actions to be taken. The initial actions are to (1) enter information to be compared with that in the database (for either identification of an unknown or selection of crabapples with given characteristics), (2) evaluate the entered data and provide the results, (3) print information in the database and (4) print forms for use in collecting data. The user selects the descriptors to be entered, such as color of petals, and then selects from the menu the applicable characteristics. Dimensions of fruit, leaves, and flower structures can be entered. After the desired or available descriptive information has been entered, the user has the choice of using that information to identify an unknown that meets the descriptive information entered or to select the crabapples that have those characteristics.

The evaluation of the entered data starts with the assumption that all crabapples included in the database are potential candidates. It eliminates those names in the database that do not meet certain criteria. The way the program processes the data entered by the user depends on how it is to be used, whether to identify an unknown or to select crabapples having the same characteristics as that entered. There are two reasons for this. First, let us start with the assumption that there are no data available on a crabapple in the database for a given descriptor, say fruit color, and the user has entered the color of the fruit. If the user

wanted to have a listing of crabapples having the same color as that entered, the program would eliminate this given crabapple from the database because it cannot be certain that the fruit has that color. On the other hand, if the user is interested in identifying an unknown under the same condition described above, then the program would not eliminate the name from the list of potential candidates because it could have that characteristic.

The second difference in evaluating data comes when comparing entered data with its counterpart in the database. If it is "obvious" that the crabapple in the database does not "fit" the entered description, then the program eliminates that crabapple from contention. For instance, if the entered data were for pink flowers, then a crabapple having purple flowers would be excluded. On the other hand, a crabapple in the database having pink to white flowers may or may not be eliminated. What happens depends on how the entered data are to be processed. If the user wants a listing of crabapples having "pink" flowers, the program eliminates all crabapples that are not shown to have "pink" flowers. However, if the user wants to identify an unknown, then the program evaluates the entered data more leniently and will not reject a crabapple if it does not have "pink" flowers, as such, but does have "pale pink to white", "flesh pink", or "rose pink" colors. Those crabapples could have "pink" flowers according to the evaluator. Many other descriptors are handled similarly. This is done whenever there is the possibility of using different descriptions for a given condition.

Dimensional data are evaluated statistically by the program. If there is a high probability that the data in the database for a given crabapple are different from that as entered, then the program eliminates that name from contention.

After all entered characteristics have been compared to corresponding characteristics in the database, the program then lists the data as entered and lists the names of the crabapples in the database that were not eliminated during evaluation. The user has the choice of listing the data on the screen or on paper.

The database contains descriptive information about the following characteristics:

Flowers

Type	Style base pubescence	Fragrance
Color of bud	Pedicel color	Hypanthium diameter
Color of balloon	Pedicel stiffness	Hypanthium pubescence
Color of flower	Pedicel pubescence	Hypanthium length
Fading of flower	Pedicel length	Ovary color
Petal shape	Calyx length	Ovary diameter
Petal shape code	Calyx color	Flower diameter
Petal base shape	Calyx pubescence inside	Number of petals
Petal apex shape	Calyx pubescence outside	Filament length
Petal position	Calyx lobe shape	Filament color
Petal length	Calyx tube constriction	Number of stamens
Anther color before anthesis	Calyx tube pubescence	Number of styles
Anther color after anthesis	Blossom time	Inflorescence number
Style length before anthesis	Blossom time code	Inflorescence position
Style length after anthesis	Blossom time index	Inflorescence form
Style color		

Fruit

Color immature	Dots color	Fruit persistence
Color ripe shaded side	Luster	Fruit diameter
Color ripe sunny side	Wax on fruit	Fruit length
Blush intensity	Flesh color body	Ratio diameter/length
Blush color	Flesh color near skin	Pedicel length
Bloom intensity	Core-line intensity	Seed weight
Bloom color	Core-line color	Seed length
Dots intensity	Seed color before maturity	Seed width
Dots quantity	Seed color after maturity	Cavity width
Dots size	Fruit shape longitudinal	Cavity depth
Dots distribution	Fruit shape transverse	Calyx scar diameter

Leaf

Color young	Pubescence bottom mature	Leaf base shape
Color mature	Lobes vigorous shoots	Leaf apex shape
Color fall	Lobes mature shoots	Leaf length
Pubescence top young	Petiole pubescence	Leaf width
Pubescence bottom young	Petiole length	Margin
Pubescence top mature	Stipule length	Leaf shape

Tree

Shape	Branching texture	Tree height
Spurs	Branching habit young	Tree width
	Branching habit mature	

There are expected to be about 900 crabapples listed in the database. Every effort is being made to make the database as complete as possible. Descriptive information is available for about three-fourths of the crabapples in the database. Information on some crabapples is very meager, and for a few, almost complete.

The program is under evaluation by Thomas Simpson and Peter Bristol. Several improvements have been added to the program as a result of their evaluations. The Board of Directors at the August 1991 meeting agreed to make a concerted effort to identify the crabapples that are commercially available and to assist in developing complete descriptions for all those crabapples. The program and data will then be made available to the members of the society. In the meantime, members of the IOCS are welcome to request information about the program, or about data available on crabapples.

Editor's Note: Anyone wishing to help collect data on the standardized data sheets, wishing to send plant material to the Editor, or wishing to know which taxa need more information should correspond or call the Editor.

CRABS YOU SHOULD KNOW

Malus baccata 'Walters'

David E. Guthery

In my evaluation of 165 ornamental crabapple taxa, *Malus baccata* 'Walters' - Walters Siberian Crabapple - consistently rated as the highest gold-fruited taxon. *M. baccata* 'Walters' originated as a seedling of ordinary *M. baccata* sold to the city of Maplewood, New Jersey. Richard Walters, city arborist, noticed its superior qualities and selected it. *M. baccata* 'Walters' was later introduced by Princeton Nurseries, Princeton, New Jersey.

Characteristic of other *M. baccata*, Walters Siberian Crabapple exhibits good vigor and develops a dense, round form. The dark green foliage is extremely glossy and remains attractive throughout the entire season, developing a good yellow fall color. In spring, the rose-red flower buds unfold to 33 mm, single, white flowers. A pink blush graces the petals as they open, but the petals quickly fade to white within a day or two. At the Longenecker Gardens in the University of Wisconsin-Madison Arboretum, *M. baccata* 'Walters' annually blossoms on average the first week in May, along with the majority of crabapples.

In early September, the 10 mm fruits develop an Indian yellow (612) color with a Mars orange (013/1) cheek (as determined using the Royal Horticultural Colour Chart). In November, the small fruits change to a lively cider color, garnet brown (00918/3). The fruits remain showy in the winter landscape until March, when they soften and are taken by birds.

In my observations at the Longenecker Gardens from 1989 to 1991, the foliage of *M. baccata* 'Walters' remained free of apple scab lesions, despite extensive defoliation on other crabapples from apple scab during the summers of 1990 and 1991. I did not observe fire blight on *M. baccata* 'Walters', although considering its lineage, it could be susceptible.

Like two other outstanding crabapples, 'Professor Sprenger' and 'Ormiston Roy', *M. baccata* 'Walters' carries a name that has little sales appeal. Hopefully, as *M. baccata* 'Walters' becomes more familiar and widely used, its ordinary name will signal its exceptional qualities.

Several cultivars deserve a special mention for their extreme persistence and maintenance of good fruit showiness. 'Adams', 'Donald Wyman', 'Indian Summer', 'Ormiston Roy', 'Red Barron', and 'Sugar Tyme' had an excellent, persistent fruit display into February. 'Donald Wyman' also deserves further mention, since its fruits not only maintained good color and persistence, but remained hard unlike the other cultivars whose wrinkling detracted from their appearance. 'Red Jewel' normally would have scored higher in evaluations, but the two trees at the Longenecker Gardens fruited sparsely this season. However, its fruit display while lessened maintained its showiness throughout the winter.

FRUIT DISPLAY

Cultivar	Size and Color	Fruit Showiness				
		10/89	11/89	12/89	1/90	2/90
'Adams'	14 mm, maroon	6+	6+	6+	6+	6+
'Amberina'	11 mm, red	8-	8-	8-	8-	0-2
'Anne E.'	11 mm, red	8+	8	8	8-	-
baccata 'Walters'	10 mm, clear cider	8	8	8	8	2-4
'Beverly'	13 mm, red	8	6-8	6-8	4	2
'Bob White'	10 mm, gold/cider	8	8	6-8	6+	2
'Centurion'	13 mm, red	6-8	6-8	6-8	6-8	2
'Donald Wyman'	13 mm, red	8+	8	8	6	6
'Harvest Gold'	14 mm, golden	6	6	6	4	2
'Indian Summer'	15 mm, red	8-	8-	8-	8-	6-8
'Jewelberry'	11 mm, red	8-	8-	6	6	-
'Morning Sun'	10 mm, orange/cider	4-6	6	8	6-8	4-6
'Ormiston Roy'	10 mm, orange/cider	8	8	8	8-	6
'Profusion'	12 mm, red	8-	6+	6	6	6-
'Red Barron'	16 mm, red	6+	6+	6+	6+	6+
'Red Jewel'	13 mm, red	4-6	4-6	4-6	4-6	4
'Silver Drift'	13 mm, red	6+	6+	6+	6+	4
'Sugar Tyme'	17 mm, red	8-	6+	6+	6+	6+
'Weeping Candied Apple'	16 mm, red	6+	6+	6+	6+	4
'White Cascade'	12 mm, golden/cider	8-	8	6	2-4	2

MALUS OBSCURUS

Malus halliana Koehne, Hall's Crab

Thomas L. Green
Morton Arboretum

Malus halliana is named after Dr. G. R. Hall, an American physician who lived in China and Japan for many years. He introduced the plant from Japan in 1863 (1). The first mention of this plant was a note in the Rural New Yorker (2) under the name *Malus Halleana*. Koehne (3) provided the first taxonomic description (leaves and flowers only) in 1890. It is noteworthy that his taxonomic description lacks information that is given in later descriptions, making the history of this crabapple different from most other crabapple species. Rehder (1) was the first to describe the crabapple as having andro-polygamous flowers. A typical flower cluster has 2-6 flowers. Some of the flowers within an inflorescence are reported to have stamens only (andro-polygamous). I am not aware of any other crabapple species that has that characteristic. Asami (4) also reports this characteristic in this crabapple. Bailey's (5) reference to this characteristic may have been "borrowed" from Rehder's earlier description.

Another unique feature is that it is described as having single (5 petals) and semi-double flowers (6-10 petals). This is reported in three references (6, 7 & 8). It is such an unusual characteristic that I would think that other references would have mentioned it. None of the other taxonomic references provides any information on petal number. Arie den Boer reported petal number as 5 (9).

I checked our herbarium and found only one *M. halliana* specimen. None of the inflorescences are polygamous, and all flowers have 5 petals. I would like to have those who have this species in their collection to check their plants in bloom next spring. If possible I would like to obtain dried and pressed samples to compare.

Almost all references agree on the leaf and fruit characteristics, although the key in Rehder (10) lists "fr. pyriform, small" and later in the text describes the fruit as obovoid (close but not the same). Pyriform is pear-shaped; obovoid is inversely egg-shaped. An illustration by Schneider (11) shows the fruit as being obovoid. A drawing by den Boer (9) shows the fruit as being subglobose. He also describes another rather unique feature about the fruit, green flesh. Most crabapples have yellow flesh; a few have red flesh.

The taxonomic descriptions of Rehder (1) and Bean (6) are very good. Asami (4) probably has the most comprehensive description. I have selected Bean's for use.

> A small tree 12 to 18 ft high; young branches purple, soon quite glabrous. Leaves ovate to oval, 1.5 to 3 in long, half as wide, rounded or tapering at the base, rather long-pointed, slightly toothed, the midrib glandular and slightly hairy above, otherwise the leaf is quite glabrous on both surfaces and of a dark polished green above, often purple-tinted, especially on the midrib; stalk 0.5 in or less long. Flowers deep rose, 1 to 1.5 in across, from 4-7 in a cluster, each flower on a glabrous, reddish-purple stalk 1 to 1.5 in long; petals 5-8; calyx reddish-purple and glabrous outside, woolly within; calyx lobes triangular-ovate, blunt at the apex. Fruits obovoid, purple, the size of a small pea, marked at the top with the scar of the fallen calyx.

Asami (4) lists the fruit size as 3/16-5/16 (5-8.5 mm). Several references cite the nodding or pendulous nature of the flowers. In Japan it is called "Suishi-kaido". "Suishi" means pendulous (4).

Malus halliana var. *Parkmanii* Rehder

The first mention of the Parkman Crab was by F. L. Temple in 1887 (12). He indicates that the tree was brought to this country by President Clark of Amherst (MA) Agricultural College (date unknown). He describes a double flowering tree with carmine buds, the weight of which causes them to bend down "into a graceful curve, which adds greatly to the whole effect." He also describes the autumn colors of the foliage as "equal to those of *Liquidambar* or any other tree we have." Sargent (13) states that this plant was sent to Francis Parkman in Jamaica Plain by F. Gordon Dexter of Boston circa 1865. "The same variety was afterwards sent to the Messrs. Parsons, of Flushing, by Dr. G. R. Hall, . . .; and it now appears in trade catalogues, both as *Pyrus Parkmani* and *P. Halleana*." Sargent's article includes a photograph of a double flowering crabapple (upside-down) which I believe to be Parkman Crab. Bean (6) and Wyman (14) state that it was introduced by Hall. Who knows???

Real confusion about this plant concerns its petal number. I have found 4 taxonomic references which call it a semi-double (6-10 petals). Den Boer (9) counted 8-11 petals. There are 5 taxonomic references which call it a double (11 or more petals) or specifically state 15 petals. Although Asami (4) does not say anything about var. *Parkmanii*, his general

statement, "The majority of the flowers of *M. halliana* cultivated in Japan are more or less double flowers having 6-15, rarely 20 petals, and simple flowers with 5 petals are seen mixed among these double flowers.", adds more confusion as to the true identity of var. *Parkmanii*. None of the taxonomic references clearly differentiate it from its species by flower color or fruit characteristics. Does it have andro-polygamous flowers? Is it always double?

Malus halliana var. *spontanea*, Makino

Spontaneous (wild) plants have been found on Mt. Kirishima (Kyushu Islands). They are believed to be the botanical origin of *M. halliana*. Variety *spontanea* differs from the original species description in its denser and stiffer habit, somewhat broader and smaller leaved, slightly smaller flowers pinkish in bud, but white when fully open and less deeply colored pedicels and calyx. The flowers appear always to be single (5 petals). Asami (4) has not found any with more than 5 petals and none to be polygamous. The fruit are slightly larger (8-11 mm [5/16-7/16"]), yellow with a red cheek becoming dark red, soft, and somewhat translucent when fully ripe. Yu (15) states that wild varieties have been found in south-western and southeastern parts of China. However, he does not provide specific information about where they have been found or comparison to the species or its varieties.

Collecting crabapples from Japanese gardens during the 1800's has created a lot of confusion (in their taxonomy). For example, *M. halliana* var. *spontanea* was first described as *M. floribunda* var. *spontanea*. Makino mistakenly called *M. halliana Malus floribunda*. The Japanese Flowering Crab, *M. floribunda*, described by von Siebold, is unknown in Japan.

With *Malus halliana*, a garden selection was believed to be the source of the taxonomic description. The wild trees were relegated to varietal status. I am not sure whether Dr. Hall sent plants or seeds to the United States. Seeds taken from gardens containing other crabapples always risk the chance of introducing hybrids. Did Koehne describe the same plant sent to the United States by Dr. Hall? Is Koehne's description taken from a herbarium specimen or a living plant? Answering all the questions will take extensive detective work. It would be nice to see the herbarium sheets of flower shoots of the original plants. It may not be possible to obtain original herbarium sheets from German sources because of destruction of herbaria during World War II.

Literature Cited

(1) Rehder, A. 1903. Sargent, Trees & Shrubs, I. p. 35-6, Pl. XVIII.
(2) 1882. The Garden. XXII. p. 162.
(3) Koehne, E. 1890. Die Gattungen der Pomaceen. Gatt. Pomac. 27-8.
(4) Asami, Y. 1927. The Crab-Apples and Nectarines of Japan. Naka-Shibuya, Tokyo.
(5) Bailey, L. H. 1924. Manual of Cultivated Plants. The Macmillan Co. London.
(6) Bean, W. J. 1976. Trees & Shrubs Hardy in the British Isles. 8th Ed. Vol. II. John Murray.
(7) Wyman, D. 1955. Crab Apples for America. AABGA Publication.
(8) Krussmann, G. 1986. Manual of Cultivated Broad-Leaved Trees & Shrubs. Vol II. Timber Press, Ore.
(9) den Boer, A. undated collection of crabapple data and drawings.
(10) Rehder, A. 1940. Manual of Cultivated Trees and Shrubs Hardy in North America. 2nd Ed. The Macmillan Co., New York.
(11) Schneider, C. K. 1906. Handbuch der Laubholzkunde. G. Fischer, Jena.
(12) Temple, F. L. 1887. Pyrus Spectabilis, Parkmanii, and Chinese Weeping Lilac. The Gardener's Monthly and Horticulturist. XXIX. p. 35-6.
(13) Sargent, C. S. 1888. Plant Notes: Japanese Apples. Garden and Forest. I. 152.
(14) Wyman, D. 1977. Trees for American Gardens. The Macmillan Co., New York.
(15) Yu, T. C. 1979. Taxonomy of Fruit Trees in China. p. 87-122.

90% WORM-FREE CRABAPPLES USING THESE NO-SPRAY METHODS

R. Kurle
10 So. 055 Madison St.
Hinsdale, IL 60521

There are two insects that cause the major insect damage to growing crabapples. The first is the codling moth. The pupae spend the winter in the ground. In northern Illinois they appear about May, breed, and lay their eggs on the new apples right after blossom time, causing the formation of a worm in the crabapples.

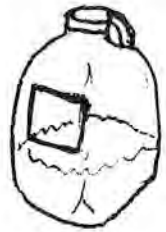
The second insect is the apple maggot. In the Chicago area, this pest comes out in early June as a fly that is attracted to bright red or yellow objects in the trees. It also lays its eggs on crabs, causing a worm that is small but puts tunnels through the crabapple, resulting in rotting fruit.

The following are two formulas that can control the codling moth. The first is from Brother Placid of Iowa:

1. 1 cup of vinegar
2. 1/4 cup of molasses
3. 1/8 cup of sweet pickle juice or Little Bo Peep ammonia
4. water to make 1 1/2 quarts

Another formula

1. 9 parts water
2. 1 part molasses
3. 1 part honey
4. some yeast



You can put the liquids in gallon plastic milk jugs that are empty. Cut into the side of the bottle as shown in the illustration. The handle is left on the bottle so you can hang it in the tree. About two bottles should be used for a large tree. The aroma of the liquids attracts the codling moths, and they fall in the liquids and drown. When many of the moths are caught, they are strained out, and more of the formula is added as needed.

The first year you can expect about a 50% reduction in the moths, and I claim final protection of over 90%.

To control the apple maggot, advantage is taken of its attraction to bright red and yellow objects. Red plastic spheres or red painted metal strips coated with a sticky material such as tanglefoot or glycerine will trap the apple maggot fly before it is able to lay its eggs. The objects should be hung on the trees like fruit. Red spheres are available from the Necessary Trading Company, One Natures Way, New Castle, VA 24127-0305. They recommend about one trap per bushel of expected fruit. While the spheres are available commercially, almost any small red or yellow object will do. I have used three-by-five-inch metal strips painted bright red. Since some crabs are resistant to these pest problems, it is advisable to wait until you have seen fruit damage before making or purchasing these devices.

KELSEY CRABAPPLE

John H. den Boer

The readers are asked to help John den Boer in properly describing the crabapple(s) going under the name of 'Kelsey'. This crabapple has been described as having single flowers and having double flowers. Material received by A. F. den Boer from H. P. Kelsey in 1940 produced single, pale pink flowers. Mr. H. P. Kelsey started listing this crabapple in 1934 as "Snowbank". In 1940 he changed the name to Kelsey Flowering Crabapple. Dr. Roland Jefferson in his "Crabapples of Documented Authentic Origin" describes the flowers as being single, pink, open white.

The crabapple identified as 'Kelsey' at Morton Arboretum has double flowers. 'Kelsey' is described in the Winter 1990 issue of MALUS as being semi-double, purple-red, white center. Roger Vick, curator at the Devonian Botanic Gardens in Edmonton advised the writer that he has not heard of a single white-flowered 'Kelsey'.

It appears that there are two different crabapples with the name of 'Kelsey'. It is very possible that one is not correctly identified. If anyone has the answer to this problem, please contact the writer. It would be nice to have authoritative information that will clear up this problem.

VIRUS ELIMINATION AND CERTIFICATION OF CRABAPPLES

by Keith Warren
Propagator
J. Frank Schmidt & Son Co.

Oregon and several other states have established virus certification programs covering ornamental crabapples. Oregon's ornamental program is very well developed, covering the widest range of cultivars. It is a vigorous program: all known viruses are removed, and scion blocks are carefully inspected to prevent reinfection. Trees are then grown under a strict set of rules assigned to produce the cleanest possible stock.

The process toward virus certification is a long and tedious one. It begins by establishing a single plant known to be virus free. To do this, plants are grown in a heat chamber at approximately 105 degrees F. The high temperature inhibits virus growth, and with a little luck, the plant will produce a small amount of new growth which is free of viruses. This is a tricky process, as crabapples don't like growing at 105 degrees. After heat treatment a very small piece of soft new growth (perhaps a 1/2" piece) is grafted on to a very small understock which is known to be virus free.

The heat treatment is an imperfect process. Its purpose is to suppress virus replication to the point that the terminal of the tree has outgrown the virus. It doesn't always work, so the plant must be carefully screened for the presence of viruses.

When the grafted plant has put on enough size to produce wood for budding and grafting, it is checked. This process is known as virus indexing. As viruses are known to be transmitted by grafting, pieces of the heat-treated plant are grafted on to a variety of highly sensitive virus indicator plants. If any virus is present in the original plant. it will show itself by its harmful effect on the indicator plant.

Once the plant has been indexed and established as free from all known harmful viruses, it is grown to increase its size, then propagated by budding on virus-free understock. These trees are then distributed to nurseries. These become registered scion block trees which are planted out into fumigated ground.

Careful insect control and isolation of this block helps keep it clean. Every year before propagation season, scion trees are sampled and tested, using the ELISA technique (enzyme-linked immunosorbent assay) and other tests. ELISA is a recently developed technique which can quickly determine the presence of a specific virus by use of an antibody serum.

Nurseries then propagate their trees by cuttings or by budding on to virus-certified understock. The resulting trees sold are certified by the Oregon program as having been produced by propagation from registered trees in accordance with the program's strict regulations. Trees produced in this way are the healthiest available.

HELP NEEDED ON INFORMATION FOR CRABAPPLE DATABASE

The help John den Boer received this year in adding information to the database of descriptive information on crabapples has been magnificent. He thanks all who have contributed in sending fruit, leaves and other information.

Now he is asking for some additional help on tree shapes, branching textures and habits, and tree size. This is information that can be obtained only by making observations on the spot. He is looking for volunteers that would be willing to fill out a form for each tree he or she is willing to evaluate. Anyone interested in helping is asked to advise him of their willingness to help, to indicate how many trees they would be willing to evaluate, and the location of the trees. He will then match the names of the crabapples at that location for which he needs information considering the limitation on the number of trees to be evaluated and provide each volunteer with the names on the crabapples for which he would like to have this information.

This is something that can be done at any time of the year. However, the winter is especially good for evaluating shapes and branching habits.

For additional information contact:

John H. den Boer
Rt 2, Box 197A
Killen, AL 35645
205-757-4787

DIRECTORS

Front Cover Photo: *Malus halliana* var. *Parkmanii*
Photo Credit: Thomas L. Green

Back Cover Photo: *Malus baccata* 'Walters'
Photo Credit: David Guthry