HURRICANE "DONNA" AND ITS AFTER EFFECTS
TO A CHATHAM, MASSACHUSETTS, GARDEN

We have 8 acres here in Chatham, originally covered with native shrubs and trees and later cleared in some portions to allow for planting other material. The land slopes from a hill down to a salt water inlet; beyond is Stage Harbour and the open Atlantic. The southwest hurricane winds of "Donna" on Monday, September 12, 1960, had an unobstructed path to our property direct from the ocean; there is absolutely no cover between.

Wind damage was surprisingly slight; it was much more in evidence in the Middleboro, Bridgewater and Brockton areas. However, large limbs broke off on Ailanthus altissima and several tall trees of Pinus rigida. Another Ailanthus altissima was uprooted and many terminal twigs of Pinus rigida were strewn on the ground.

The other hurricanes experienced here, beginning with the hurricane of 1938, were accompanied by deluges of rain. This meant that although salt water spray was deposited on the foliage, the wash-off resulting from the heavy rains prevented any noticeable salt spray damage on this property. Hurricane "Donna," however, brought to Chatham a scant .20 inches of rain. Consequently, when the winds ceased, our windows on the southwest side of the house had the appearance of having been white-washed.

Some plants showed no ill effects whatever from this salt bath. We have 650 plants of Pinus thunbergii, most of them from 12 to 16 feet tall, and not a needle turned color. The only exceptions were the 10 trees which are variants from the type and the greater the variation from type, the more needles that were browned.

Following the hurricane, many trees and shrubs whose leaves were 100% browned put out new leaves all over. This was natural in view of the later fall rains and the warm temperatures which we enjoy on Cape Cod in September, October and November. Forsythia and one or two other shrubs even put out a few scattered flowers. Walking over the property in January, I was encouraged to see in general good leaf and flower buds on most plants.
Holly Notes Interesting

Mr. Wilfrid Wheeler of Falmouth and Mr. Louis H. Carter of East Orleans, have compared notes with me on the hardiness of hollies in the Cape Cod area. A surprising number of them can be grown and with an expectancy of complete hardiness, although some survive better at Chatham than they do at Falmouth. Damage was greater there this past winter, not so much because of any vagaries of Hurricane "Donna," but because the winter temperatures there were lower (down to \(-12^\circ F\).) than at Chatham (\(+5^\circ F\).).

*Ilex opaca* showed a general die-back of 1-3/8", whereas with *I. aquifolium*, presumed to be less hardy, many varieties went through unscathed in my plantings and even though the leaves may have shown a very slight injury, the twigs were in perfect condition, plump up to the end, in May 1961. The *Ilex aquifolium* varieties were badly injured at Falmouth. Some were killed outright, some were killed to the snow line, while others, at best, required severe pruning. The Chatham planting apparently had more salt spray than those at Falmouth. It seems a fair conclusion that *I. aquifolium* will come through a complete salt bath successfully when the following winter’s lowest temperature is 5° F. or higher and the soil is good, but severe loss can be expected when salt spray is followed by winter temperatures of much below zero or when plants are growing in extremely poor, sandy soil.

Mr. Wilfrid Wheeler of Falmouth took holly cuttings early in 1961 from plants which had been exposed to Hurricane "Donna" and later observed that never in his long career did he have such difficulty in obtaining rooted cuttings, for only 60% of *Ilex aquifolium* cuttings rooted, in comparison with other years. Of *I. opaca* cuttings, some rooted normally, while others rooted only 15% as well as they had done in other years.

Given good soil and proper culture, it is evident that in an area with Chatham’s temperatures a wide selection of *Ilex* species and varieties can be successfully grown, even to the accompaniment of a thorough salt bath. The varieties of *Ilex* in the following lists have been thoroughly hardy at Chatham, year after year, without any winter damage. The varieties of *Ilex opaca* growing at Chatham are:

<table>
<thead>
<tr>
<th>Aaron</th>
<th>Emily</th>
<th>Pearle le Clair</th>
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<tbody>
<tr>
<td>Aalto #8 and 6</td>
<td>Fallaw</td>
<td>Perpetual</td>
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<tr>
<td>Aalto Lunn</td>
<td>Freeman</td>
<td>Polly</td>
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<tr>
<td>Amy</td>
<td>Goldie</td>
<td>Robin Tree</td>
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<tr>
<td>Ashumet</td>
<td>Griscom</td>
<td>Ruth</td>
</tr>
<tr>
<td>Barberry</td>
<td>Kate</td>
<td>Sally</td>
</tr>
<tr>
<td>Barbosa</td>
<td>Laura Thomas</td>
<td>St. Ann</td>
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<tr>
<td>Betty Ann</td>
<td>Laurie</td>
<td>St. Mary</td>
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<tr>
<td>Big Tree</td>
<td>Lawrence</td>
<td>Vera</td>
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<tr>
<td>Davis</td>
<td>Mt. Vernon</td>
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<tr>
<td>Elizabeth</td>
<td>Natale</td>
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</tbody>
</table>
The following are *Ilex aquifolium* varieties which are growing so successfully here and in Orleans. The asterisks (*) indicate those varieties which, through the years, have also proved hardy at Falmouth:

<table>
<thead>
<tr>
<th>Variety</th>
<th>Father Name</th>
<th>Species</th>
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<tbody>
<tr>
<td>alicornis</td>
<td>Father Charles</td>
<td>Lawson</td>
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<tr>
<td><em>Alice</em></td>
<td>Fertilis</td>
<td>Moore</td>
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<tr>
<td><em>altaclarensis</em></td>
<td>Firecracker</td>
<td>ovata</td>
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<tr>
<td><em>Ames</em></td>
<td><em>Glory</em></td>
<td>pendula</td>
</tr>
<tr>
<td>Angustifolia</td>
<td>Gold Gem</td>
<td>perado</td>
</tr>
<tr>
<td>Arnold</td>
<td>Gold Milkmaid</td>
<td>Pinto</td>
</tr>
<tr>
<td>Belgica</td>
<td>Golden Queen</td>
<td>recurva</td>
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<tr>
<td><em>Boyce Thompson</em></td>
<td><em>Goliath</em></td>
<td>Rederly</td>
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<tr>
<td>Brownell’s Special</td>
<td>Green Knight</td>
<td>Scotia</td>
</tr>
<tr>
<td><em>camelliaeolia</em></td>
<td>Green Maid</td>
<td>Shepherd</td>
</tr>
<tr>
<td><em>ciliata major</em></td>
<td><em>Hazel</em></td>
<td>Teufel’s Dwarf</td>
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<tr>
<td>Echo</td>
<td>Henderson</td>
<td>Teufel’s Hybrid</td>
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<tr>
<td>Escort</td>
<td><em>James G. Esson</em></td>
<td>Whitney #2 &amp; 3</td>
</tr>
<tr>
<td>fructu-aureantiaco</td>
<td><em>Jan Van Tol</em></td>
<td>Whitney Lunn</td>
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<tr>
<td>fructu-luteo</td>
<td>laurifolia</td>
<td>Wilson</td>
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</tbody>
</table>

Also 17 other seedlings unnamed.

For those plants of *Ilex* that were damaged this year for the first time, undoubtedly due to salt spray injury, see page 71.

*Ilex crenata*. All named clones of the species *I. crenata* (Japanese holly) that we have tested thrive well. These include *compacta, convexa, ‘Glass,’ ‘Green Cushion,’ ‘Helleri,’ ‘Hetzii,’ Howardi,’ ‘Longfellow,’ major, microphylla maculata, oleafera, ‘Stokes’ and ‘T 1’ (Tingle).

Miscellaneous species. Other species proved perfectly hardy are *cornuta* (Chinese holly), varieties ‘Burford,’ 'National,' ‘Rotunda,’ and eleven seedlings and cuttings without names; *glabra* (the native Inkberry), *pedunculosa, pernyi* in four different forms, its variety veitchii, *verticillata* and the hybrid *aquipermyi* (*aquifolium × pernyi*).

General Comments

Here are some general observations as a result of closely examining the plants subjected to this salt spray bath in September, 1960:

If a tree or shrub were in poor condition from whatever cause, it invariably suffered greater damage from salt spray than did healthy specimens of the same species.

Shrubs attempting an existence in what is largely Cape Cod sand were usually hurt more than the same species growing in good soil. Fortunately, our own soil is excellent and our material came through better than that of people whose soil
is chiefly sand. The damage was much more extensive in Falmouth than in Chatham. Because of this, apparently low temperatures in the winter also contributed to the injury, for Falmouth’s low reading in the winter 1960–1961 was $-15^\circ$ F., while Chatham’s was $+5^\circ$ F. Many of our shrubs showing 1–12” die-back were a total loss in Falmouth.

**List of Woody Plants Observed**

Explanation of symbols: **Bold Face**—Although some may have had the leaves partly or wholly burned with salt spray right after “Donna,” these plants showed no injury nine months later.

*—Slight salt browning of foliage after hurricane; not serious.

†—Leaves of entire shrub or tree browned immediately after hurricane.

If inches or feet are noted after the name, it indicates that the twigs died back just that much in the nine months after the hurricane.

<table>
<thead>
<tr>
<th>Plant Name</th>
<th>Injury Description</th>
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<tbody>
<tr>
<td>Abelia grandiflora 1–3‘ (slightly more than usual) *</td>
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<tr>
<td>Abies balsamea, few stems 6” *</td>
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<tr>
<td>Acer palmatum atropurpureum 3–4‘ †</td>
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<tr>
<td>Albizzia julibrissin rosea, one died; another 6”–2’ *</td>
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<tr>
<td>Amelanchier canadensis</td>
<td></td>
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<tr>
<td>Arctostaphylos Uva-Ursi</td>
<td></td>
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<tr>
<td>Aronia arbutilofila</td>
<td></td>
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<tr>
<td>‘melanocarpa, 2-4’</td>
<td></td>
</tr>
<tr>
<td>Berberis thunbergii †</td>
<td></td>
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<tr>
<td>‘atropurpureum, few twigs, 2-4’</td>
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</tr>
<tr>
<td>Berberis triacanthophora, most twigs, 3-6’</td>
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<tr>
<td>Berberis verruculosa, few twigs, 1-3’</td>
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<tr>
<td>Berberis thunbergii ‘Crimson Pygmy’</td>
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<tr>
<td>Betula papyrifera, one, no damage; another 10 feet away, 2½’</td>
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<tr>
<td>Buxus microphylla compacta</td>
<td></td>
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<tr>
<td>‘microphylla ‘Curly Locks’</td>
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<tr>
<td>‘sempervirens (some people whose plants are in sand had complete loss)’</td>
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<tr>
<td>Buxus sempervirens rotundifolia</td>
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<tr>
<td>‘sempervirens, variegated</td>
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<tr>
<td>‘sempervirens ‘Vardar Valley’</td>
<td></td>
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<tr>
<td>Callicarpa japonica, normal dieback only</td>
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<tr>
<td>Calluna vulgaris, 23 varieties</td>
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<tr>
<td>‘vulgaris aurea *</td>
<td></td>
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<tr>
<td>‘pygmaea *</td>
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<tr>
<td>‘rubrum *</td>
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<tr>
<td>‘J.H. Hamilton’ *</td>
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<tr>
<td>Carya illinoensis, 4’ †</td>
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<tr>
<td>Caryopteris incana, 8–19’/</td>
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<tr>
<td>Celastrus scandens, 3–6’</td>
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<tr>
<td>Cercidiphyllum japonicum, 6”–2’ †</td>
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<tr>
<td>Cercis canadensis † (died)</td>
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<tr>
<td>Chaenomeles lagenaria ‘Apple Blossom’</td>
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<tr>
<td>Chionanthus virginiana, 3–6’ †</td>
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<tr>
<td>Clematis virginiana, normal dieback only</td>
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<tr>
<td>Clethra alnifolia</td>
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<tr>
<td>Cornus alternifolia, most showed 6–18‘, some even 3’; a few died. Have about 30 which were native here. †</td>
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<tr>
<td>Cornus florida, those in open area died; those protected by screen of pines, no damage; those surrounded by shrubs died above line of shrubs. †</td>
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<tr>
<td>Cornus kousa, 6-18’ †</td>
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<tr>
<td>‘mas, 3-6’ †</td>
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<tr>
<td>‘paniculata, 18’ wind side; lee side no damage †</td>
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<tr>
<td>Cornus stolonifera flaviramea</td>
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</tbody>
</table>
Cotoneaster apiculata
“ divaricata
“ floribunda, 4–12” *
“ foveolata, some twigs, 4” *
Cotoneaster franchetii, 18” wind side, some in more protected spot unharmed *
Cotoneaster horizontalis, 1” wind side *
Cotoneaster horizontalis perpusilla
“ microphylla buxifolia
seedling
Cotoneaster multiflora, 4” *
“ racemiflora, 3–6” *
“ wardii; some stems 3’; where more protected, no damage *
Crataegus oxyacantha paulii
“ phaenopyrum
Cytisus kewensis
“ praecox
“ praecox alba, few stems 5’
“ purgans
“ scoparius andranus, one stem only died
Cytisus scoparius var., large, old plants died; healthy young stock, 6–24”
Davidia involucrata ‡
Deutzia gracilis, 3–6” ‡
Elaeagnus umbellata, 6–24” on wind side ‡
Enkianthus campanulatus, 3’ wind side ‡
Erica (25 varieties)
Euonymus alatus, 4” ‡
“ europaeus, 6–12’; 1 died
“ fortunei kewensis
“ fortunei vegeta
Exochorda grandiflora wilsonii, 4–12” ‡
Forsythia intermedia spectabilis, some stems 12”; some plants undamaged *
Forsythia ‘Beatrix Farrand,’ 6”–3’ *
Forsythia viridissima ‘Bronxensis’
“ ‘Spring Glory,’ some stems 12”; some plants undamaged *
Fothergilla major, 3’ wind side ‡
Franklinia alatamaha, one died in the open; one protected by pines 1–3” ‡
Gleditsia triacanthos inermis, 6–8”
Halesia monticola
Hypericum ‘Hidcote,’ normal dieback
“ ‘Sun Gold,’ “ “
Ilex aquifolium (24 varieties)
(A friend in Orleans had 2 5-ft. plants really hurt out of a total of 200.)
Ilex aquipernyi
“ cornuta
“ crenata compacta
“ “ convexa
“ “ microphylla maculata
“ “ oleafera
“ glabra
“ opaca (37 varieties), 2–8”,’ some none *
Ilex pedunculosa, 3–6” *
“ pernyi veitchii
“ crenata ‘Glass’
“ aquifolium ‘Good Luck’
“ crenata ‘Green Cushion’
“ “ ‘Helleri’
“ “ ‘Hetzii’
“ opaca ‘Howard’
“ crenata ‘Longfellow’
“ “ ‘Major’
“ “ ‘T 1’
“ “ ‘Stokes’
“ pernyi
Juglans cinera, died ‡
Juniperus virginiana—probably 200 ± on the place—remarkable variation in results of trees side by side; one wholly undamaged, the next showing complete browning on wind side; actual dieback about 4–6”
Kalmia latifolia, few twigs, 6” *
Koelreuteria paniculata
Kolkwitzia amabilis, 6–12” ‡
Laburnum vossii
Lespedeza bicolor ♡
Ligustrum obtusifolium regelianum, 3–6”, a few 2’ *
Lonicera japonica halliana
  “ tatarica, some undamaged;
  others 2’
Magnolia virginiana
  “ soulangiana ♡
  “ ‘Alba Superba,’ pink
Magnolia loebneri ‘Merrill’
  “ soulangiana ‘Rustica Superba’
Malus baccata seedling
  “ ‘Oekonomierat Echtermeyer,’ 12’ ♡
Malus prunifolia rinki
  “ sargentii (seedling)
  “ sargentii
  “ ‘Hopa’
Morus alba, 6–24” ♡
Myrica carolinensis
Nandina domestica *
Oxydendrum arboreum, 6–36” ♡
Pachysandra terminalis
Parthenocissus quinquefolia
Philadelphus ‘Belle Etoile,’ 12–18”
  “ ‘Minnesota Snowflake,’
  6–18”
Photinia villosa
Picea abies, few stems 8–14” *
  “ canadensis, few stems 8–14” *
Pieris japonica, few twigs 3”
Pinus banksiana, few twigs 4” *
  “ resinosa, few terminals dead,
  but chiefly unharmed *
Pinus rigida, some undamaged, others nearby 12’”, some worse *
Pinus strobus, exposed trees dead or nearly so, needles totally browned on entire southwest side of plants by Jan. 9, 1961
Pinus sylvestris, many large limbs and some whole trees dead where fully exposed. Needles totally browned on entire southwest side of plants by Jan. 9, 1961
Pinus thunbergii
Paulownia tomentosa ♡
Potentilla fruticosa ‘Lemon Drop’
  “ ‘Moonlight’
  “ ‘Mt. Everest’
  “ ‘Primrose Beauty’
Potentilla fruticosa ‘Klondike’
Prunus (peach and cherry) ♡
  “ (flowering peaches), died
Prunus caroliniana, few stems 3”
Prunus maritima
Pseudotsuga taxifolia, 6” on wind side on badly exposed trees; needles totally browned on entire southwest side of plants by Jan. 9, 1961. Protected tree wholly unharmed.
Pyracantha coccinea lalandi, a few slightly hurt
Quercus coccinea, some stems 12” ♡
  “ palustris ♡
Quercus pedunculata
  “ rubra, some stems 12” ♡
  “ velutina
Rhododendron carolinianum (protected spot)
Rho. dauricum sempervirens (azalea)
Rho. fortunei, a few stems 8”
  “ molle
  “ mucronatum, some branches 12” wind side; perfectly OK on lee side: some plants no damage
Rho. obtusum seedling
  “ ‘Arnoldianum, 12”
  wind side; some plants no damage
Rho. satsuki seedling
  “ schlippenbachii
  “ viscosum
  “ yedoensis poukhanensis
  “ ‘Brilliancy × satsuki’
  “ Stewartsonian’
Rosa floribunda, 24” compared to normal dieback of 8–12”

[ 72 ]
Rosa hugonis
" spinosissima
" virginiana
" rugosa 'Agnes'
" 'Blanc Double de Combert'
Rubus 'Indian summer,' all canes died to ground
Rubus 'Latham,' $\frac{3}{4}$ of canes died to ground; remainder 6-24" dieback
Salix alba vitellina, twigs 6-18"
" caprea, 6-12"
Sorbus aucuparia, some twigs 4"
Spiraea billardii, 2'
Spiraea thunbergii compacta
" trilobata, 4-6'
Styrax japonica, 12'
Symphoricarpos chenaultii
Symplocos paniculata, 12'
Syringa persica, 3'
" alba, 3'
" velutina
" vulgaris 'Leon Gambetta'
" 'Montaigne'
" 'Mme. Lemoine'
" 'Chas. Joly'
" 'Souvenir de Lud-wig Spaeth'
Syringa vulgaris 'Pres. Grevy'
" 'Sensation'
" 'Adelaide Dunbar'
" 'Blue Hyacinth'
seedling
Syringa vulgaris 'Esther Staley' seedling
Taxus baccata repens
" cuspidata (only 2 plants showed damage)
Taxus cuspidata nana
" media hattfieldii
" hicksii
Tsuga canadensis, burns badly with only normal winter winds unless completely protected.
Ulex europaeus, 2-3' (normally 18')
Ulmus americana, 6'-8'
Vaccinium corymbosum, several hun-
dred on the place; those partially protected show no damage; those in open, range from 3-6" dieback to completely dead on wind side *
Vaccinium vitis-idaea majus and minus
Viburnum carlcephalum
" carlesi
" cassinoïdes, completely dead on wind side; badly hurt on lee side. The worst hit of our 17 Viburnum varieties. V. setigerum was next. ‡
Viburnum dentatum, several hundred on the place. Of those fully exposed, some are dead and on the wind side most are dead or nearly so. Of those somewhat protected by other shrubs, some are unhurt and others have 4-12" dieback. ‡
Viburnum dilatatum, 3-6" ‡
" xanthocarpum
" opulus
" plicatum tomentosum
" prunifolium, few stems 4" ‡
" pubescens, several hundred on the place. Of those fully exposed, some are dead and most are dead or nearly dead on wind side. Of those somewhat protected by other shrubs some are unhurt and others have 4-12" dieback.
Viburnum rhytidophylloides
" rhytidophyllum
" sargentii, 4-6" on wind side ‡
Viburnum setigerum, 6-18" ‡
" sieboldii
" trilobum, 6-12" ‡
" wrightii, 3-6"; a few 19" ‡
Weigela, branches on some 1-2" ‡
" florida variegata

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