

DEFOLIATION OF MESERVE HOLLY IN STORAGE

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During the last 10 years, the Meserve holly (blue holly) cultivars have become well known and quite popular. Not only are they very attractive and rugged, but they are surprisingly free of diseases and pests that afflict other members of the genus *Ilex*. However, in the North there is one pesky problem that the commercial grower faces and that is occasional defoliation, both in the propagation stage and when container-grown hollies are coming out of winter storage.

Let me start with a brief review of defoliation in propagation and in the storage of rooted cuttings in heated houses. All of the genus *Ilex*, be it *I. opaca*, *I. crenata*, or *I. × meservae*, are sensitive to buildup of ethylene in closed structures, which is the actual culprit that causes the leaf drop. The problem usually shows up beginning in November through December when the heated houses receive only occasional ventilation. To prevent this problem we have moved the propagation of the Meserve hollies back from October to August and early September when they can be easily rooted under mist in open structures. In order to fight off the danger of ethylene buildup we take extra steps in the holly house where the flats with rooted cuttings are carried through late fall and early winter. These cuttings usually flower profusely from the end of October through early November. This is a critical period. The cuttings will have to be sprayed frequently with Benlate to prevent an outbreak of *Botrytis*, but more important, this heavy flowering will set off the vicious circle of ethylene release. To prevent this buildup we keep our holly house quite cool; the median temperature is at 42 to 50 °F while we ventilate systematically to bring in fresh air daily.

In order to accomplish this ventilation, a small pole blower has been attached to the back wall of the hut. This blower is connected to the circulation pump of the Biotherm hotwater heating system. The few times that the circulation pump comes on during each night the pole blower gets activated and will bring in outdoor air which will prevent the buildup of ethylene.

Now I would like to discuss defoliation in storage huts. Let me state here first that I do not know whether ethylene concentrations play a significant roll in storage huts. In my experience most, if not all, defoliation of Meserve hollies in winter storage is caused by damage or kill of the root system due to lower than tolerable temperatures in the medium. Ever since Dr. Havis of the University

of Massachusetts published his report on "Tolerance of Plant Roots in Storage" we at Roemer Nursery have taken special steps in storing our substantial inventory of container-grown Meserve hollies. The critical range of cold hardiness of the root system for *I. × meservae* is the 20 to 23° F range in the container medium. Conventional hut covers of opaque poly will not prevent container temperatures from dropping to those readings during extended severe cold spells. In the mid-1970s we experimented with the different covers that are used as solar blankets, sometimes referred to as liners. During one single winter we ran controlled tests with microfoam and clear and opaque poly. Clear poly is next to useless since the heat will radiate out through it on cold nights. The various types of foam blankets give excellent cold protection but there are definite disadvantages: high cost, short life, and the awkwardness of the covering process and of the removal of the foam sheets. We settled on the annual use of 20 to 24 ft wide 2 mil opaque poly for the liners which has given us reliably good protection for our hollies.

Now for a short explanation of how we arrange the blankets. Most of our houses run east-west. Prior to introducing the blankets to a hut we consolidate the containers in such a way that there is a two foot open area along the kickboard on the south side and a one foot corridor along the north side. We drape the opaque liner, loosely folded, in this north corridor prior to the actual covering of the huts during mid-November. We will then wait until either the first outbreak of severe winter weather or the week before Christmas before we pull the blanket over the plants following a heavy irrigation. Workers moving through the south corridor will finish this rather simple operation by tucking the poly under some of the pots. This south corridor with its air space and two opaque layers of poly becomes a welcome buffer against the increasing sun exposure during February. At our location we remove the holly liners around March 1st.

At this time, I would like to give a brief over-view of our general overwintering procedures since they differ significantly in some important details from those of most container growers in our area. We consider the winter storage huts as extensions of our heated propagation houses and we treat them as such. Unlike most nurseries we will ventilate the huts as much as possible all winter. From Thanksgiving until the shipping season starts in mid-March the Dutch doors on both ends of the huts will be open whenever weather conditions permit during the daytime; temperature, sunlight, and overcast naturally play a roll. But if, for instance, the winter is rather moderate, the huts will be open, especially during the day, fully half of the time. We feel that maintaining as even a temperature range inside the huts is far more important than trying to maintain as high a humidity as possible.

Next we emphasize frequent, heavy winter irrigation; partly to offset the constant ventilation, but more important to drive out any frost buildup in the containers during January and February. Between Thanksgiving and the first week of March we average 3 to 4 heavy irrigations of 1-1½ in. each. For example, here in northern Ohio we will usually get our coldest, sustained winter weather sometime between Christmas and mid-January and, in most cases, get some kind of January thaw thereafter. The moment the outdoor temperature goes up to or above 36° F we will immediately start our most important heavy irrigation. We will literally flood the huts. The benefits are threefold: the large amount of water will drastically speed up the thawing process; the saturated containers will take much longer to freeze up again come the next severe cold spell, while the heavy irrigation will leach out any salt buildup. We are not concerned about leaching out all nutrients since we are using a coated slow-release fertilizer. If we are lucky enough to get 4 to 6 days above freezing after such an irrigation the bulk of the frost will have thawed out and we are in good shape to handle the next severe cold spell.

Now back to the problem of preventing defoliation of meserve hollies in storage. I am the first to admit that in some of the mild winters we have lately experienced, and depending on one's location in the Northeast or Midwest, using solar blankets on Meserve hollies might not always be necessary. But in that case frequent ventilation and timely heavy irrigation might still be a good method to prevent root damage and defoliation. However, the use of the solar blanket is still the only certain way to prevent root damage and subsequent leaf drop. Keep in mind that once 3 or 4 gal. hollies sustain rather severe defoliation it is virtually impossible to regain a profitable quality plant.

Another factor that should not be overlooked is the importance of the proper spacing of the plants in storage, particularly the larger sizes. Setting the cans too close can cause disease problems or severe yellowing and subsequent dropping of the leaves. 'Blue Prince' holly, for instance, is rather susceptible to this problem. However, this type of leaf drop is not nearly as dangerous as the one caused by root damage.

There have been sporadic problems with severe defoliation in container-grown 'China Girl' and 'China Boy' hollies, bedliners as well as landscape plants. Even though these two clones are quite hardy, they tend to grow late into the fall; these soft shoots will then show tiny cracks caused by frost and *Botryosphaeria* will infect the plants in late March and early April causing severe leaf drop and branch dieback. Two to three applications of Benlate-manzate beginning the end of April through May will stop this problem.

We at Roemer Nursery have been using the solar blanket method for 15 years and we have come to the conclusion that this method is indeed cheap insurance to protect a high quality crop winter after winter.