THE eradication of weeds by means of applying chemicals has become a popular method in the garden, and many a gardener is probably trying out some preparation in order to eliminate tedious hand labor. In the Arnold Arboretum we have been forced to find time-saving means of eliminating weeds. Many chemical materials have been tried, and not all have proved successful. Some of our experiences have taught us lessons that may be helpful to others, and as a result, these notes are offered.

There are many kinds of weeds in every garden, but the weeds with which we have to deal in the ornamental plantings of the Arnold Arboretum are chiefly perennial weeds, and the rampant spreading quack grass (*Agropyron repens*). When allowed to grow eight inches or more in height about the base of a recently planted small tree or shrub this pernicious pest can (and frequently does) materially weaken the plant and in some cases may grow so vigorously that it will absorb a greater part of the moisture about the plant during dry spells, and so be responsible for the death of the plant.

It is this type of weed, growing around younger plants that have been set out as individuals throughout the 265 acres of the Arboretum, which has proved costly. A good many years ago, sufficient labor was available so that the weeds about all young plants could be kept in check by hand-hoeing. Now, of course, with high wages and restricted budget, such costly hand labor is out of the question. Other means must be used to control weeds. One of the methods used in weed control at the Arnold Arboretum is the use of mulches.

**Various Types Tried**

Mulches are highly desirable about many plants, and indeed, experiments have shown that on Massachusetts soils similar to those in the Arnold Arboretum, almost any kind of a mulch will aid tree growth. However, it is not quite as simple
as that in the Arboretum. In the first place, a mulch must be fairly inexpensive to meet our needs. Secondly, it must be neat in appearance, be easily maintained and not blow away in high winds. Lastly — and this is most important — it must not be easily burned or set on fire. It has proved very difficult to find a mulching material meeting all three of these essential requirements.

Hay and straw make good and cheap mulches, but they are quickly set on fire. Unfortunately, this type of vandalism is one which must be met in any public area. A flash fire about the base of a tree or shrub can easily mar permanently or even kill the plant.

Leaves have been used, but unless these are well-rotted, they burn easily, and even in the case of leaf mold, there are times when it will dry out during the hot summer months and then can easily be burned, especially during periods of high winds. Oak leaves and maple leaves, individually and mixed together have been tried without too much success.

Wood shavings, mixed with horse manure (when the shavings have been used as bedding in stables) have been tried. Under some conditions these may prove satisfactory, but under our conditions this material dries out quickly and tends to blow about, giving the plantings an unkempt appearance.

Ground coconut hulls, buckwheat hulls, ground banana stalks, and glass fibers, have been tried, but these have proved too expensive to be used extensively under our conditions. Vermiculite, too, was tried as a mulch, but it proved too expensive to be used on the large scale necessary in the Arboretum. It tended to pack down rather hard after it had been exposed to the elements out-of-doors for a few months, and it was quickly evident that it proved an ideal medium for the germination of weed seeds.

Peat moss has, of course, been used extensively in planting and when so used has been thoroughly mixed with soil. Used strictly as a mulch, it is neat in appearance, and not too expensive, but as everyone knows, it does dry out, especially in summer. We have had several experiences with peat fires in the Arboretum, and some experience with small blazes in peat mulches. The last one was the most costly. Native peat moss was obtained from a local source at a reasonable cost and was placed six inches thick about the conifers in the dwarf collection. Admittedly it looked exceptionally well. However, a month after it was applied it became very dry due to a summer drought. A fire started, either set by children or as a result of a carelessly flipped cigarette, and with a stiff breeze, flames were quickly whipped up that ruined hundreds of dollars worth of rare plants before the fire department came. A new fire was whipped into a blaze by the wind on every spot of peat moss mulch where a spark would light.

The fire department put on 600 gallons of water, and our own spray cart applied another 600 gallons that afternoon. The area burned over was about 50' x 150'. By nightfall it looked as if all the smoldering spots were out. The next morning, the peat moss in that area was smoldering in 19 places and had to be
dug out. Consequently, on areas far removed from a water supply, and where there is a fire menace in one form or another, peat moss is not the type of mulch to use, especially on valuable plants which could be destroyed by fire. It is of course widely used as a mulch, but in areas where water can be applied intermittently to keep it moist, and where there is no fire menace.

**Spent Hops**

After these experiences, and others, spent hops were used in mulching. These are obtained inexpensively and hauled directly from a local brewery while there is still a strong odor to them, but over the year and a half they have been used, they are proving better as a mulching material, for our purposes, than any of the above-mentioned materials. They are inexpensive, easily applied, look well, do not dry out quickly and do not burn readily.

Approximately 87% of their weight (as obtained from the brewery) is water, 12% organic matter, 0.4% nitrogen and 1% ash. They test very acid (pH 4.8). From this analysis, it is obvious that there is not much to them, yet the interesting thing is that after they have been exposed to the atmosphere of a dry room for over a month, they still will not blaze up and "catch fire" when a match is applied. They can be burned, yes, but the blaze goes out soon unless the fire is sustained by other combustible material. If a fire were started in the leaves about them and were fanned by a very high wind, they might burn. However, for all practical purposes it appears that they burn only with the greatest difficulty. They have been used in all parts of the Arboretum, and although we recently experienced a very severe drought, there was no fire in any of the mulches of hops, nor did these catch on fire when adjacent areas burned.

Not everyone will be sufficiently enthusiastic about their non-burning properties to use them to protect plants from fire. We have done just that, placing heavy mulches about the arborvitae specimens to prevent a possible fire from spreading to this highly vulnerable group of plants. They retain a large amount of water for long periods and so are very serviceable for use in a mulch.

When applied in the summer, and especially when applied in a mulch approximately 6" deep about a plant, care should be taken to keep the hops 6" to 10" away from young trunks and tender shoots. If this is not done, the extremely high temperatures caused by the wet, disintegrating hops in the hot summer sun, will cause injury to the succulent or tender-barked stems.

**Disagreeable Odor**

Some characteristic may appear that will prove a decided deterrent to their use as a mulch, but during the one and a half years of their use in the Arnold Arboretum, no serious drawback has been found except, possibly, their odor. In a small compact garden near the house, this would probably be obnoxious, but in
the open spaces of the Arboretum we find that the odor gradually disappears after a few weeks.

Several conditions are created in the soil under a mulch which are conducive to the better growth of plants. Mulches of hops, if thick enough, keep the weeds under control about a plant which is an additional benefit, and in many cases the most important. A thin layer, 2" to 3" deep is not sufficient to kill the weeds. A 6" mulch is effective. One of the experiments was carried out under lawn conditions. A 6" mulch of hops was placed in wide circles about several trees in February. Not a single blade of grass came through this mulch until the end of June when a few small weeds appeared. By mid-July they were growing vigorously, but a mere stirring and rearranging of the hops, covering over the vigorous weeds, was sufficient to stop all weed growth under that mulch for the rest of the season. In other words, it took about five minutes to maintain this particular hop mulch for the year.

When applied to taller, more vigorous growing grass, the grass or weeds may force growth through in a shorter period, in which case they are easily pulled. Rearrangement of the mulch several times might be equally satisfactory. However, if not promptly attended to, the few weeds that do come through the mulch will grow far more vigorously than they would without it. Mulches of hops have been placed on rhododendrons, laurel, lilacs, cotoneasters, elms, cytisus, roses, spiraeas, deutzias, hydrangeas, hollies and many other plants in the Arnold Arboretum with excellent results.

Many chemicals are also being tried at the Arnold Arboretum to combat the weed menace. Some are proving more successful than others. Burning the weeds with a flame gun has been tried in several situations and has not proved as effective a control under our conditions as the hop mulch, nor as the application of certain chemicals. These experiments are continuing and will be reported later. After a year and a half of mulching with spent hops continuously under many varied situations, they have proved highly effective material for weed control about woody plants, under the conditions prevalent in the Arnold Arboretum.

Donald Wyman

Note: The Horticultural Colour Chart (described in Arnoldia 7: 41–52), published by the Royal Horticultural Society of England, may now be purchased in this country from the Chronica Botanica Company, 79 Sartelle Road, Waltham, Massachusetts, at a cost of $14.00.