

"Distribute this bait over the infested field broadcast, taking care to sprinkle or sow it sparingly. In case bran can not be readily obtained, middlings or alfalfa meal may be successfully substituted. This poisoned bait may be safely used in alfalfa and cornfields where it is desired, if possible, to save the crop for forage purposes.

"In case the worms are not discovered until they have begun to travel in a mass, they can usually be destroyed by furrowing or ditching completely around the infested area. In attempting to cross such ditches the worms will fall into them and can easily be destroyed by crushing them with a log dragged back and forth through the ditch or furrow. If shallow post holes are sunk in the bottom of the ditch at intervals of about 20 feet, the worms will crawl along the ditch bottoms and fall into the holes, where they may be destroyed by crushing or other means. If the subsoil be of such a nature that water penetrates it but slowly, the post holes may be partially filled with water, on the top of which a layer of coal oil or petroleum may be poured. Upon falling into such holes, the worms are almost immediately destroyed without further action on the part of the farmer.

"(1) Watch fields of growing grass and grain carefully, especially the meadows, during the spring and early summer months, in order to discover the army worms before they have a chance to become full grown and spread over the entire farm. When the worms are discovered at work do not lose a minute, but attack them vigorously by means of the measures outlined in the foregoing pages.

"(2) In case the worms are crawling in a body, surround them with a furrow or ditch and crush them with a log drag as they fall into it.

"(3) Poison them by spraying crops not intended for forage purposes with 1 pound of Paris green to 50 gallons of water, or with 2 pounds of arsenate of lead to 50 gallons of water. In case the Paris green is used on tender plants, like corn, 2 pounds of freshly slaked lime should be added to 50 gallons of the mixture. This is to prevent burning the tender plants. Where spraying is not practicable, the use of the poisoned bran bait is strongly recommended."

Chemical Weed-Killers on Golf Courses

By L. W. Kephart, U. S. Department of Agriculture

There is no royal road to weed eradication, and for general, every-day weed-fighting there is nothing that beats old-fashioned strong-arm methods with the hands, hoe, scythe, and plow. However, for certain special jobs chemical weed-killers are very useful, and every greenkeeper should know something of their characteristics and how to handle them.

First be it said, before false hopes are raised, that chemicals are not of much help in combating the particular weeds which are most troublesome in turf. Hundreds of tests have been made, and tests are still being conducted, in the use of chemicals in combating crab grass, chickweed, and the other weeds destructive to fine turf, but as yet no really reliable remedy has been found, except where the weeds are treated individually, as in the case of dandelion or plantain injected with sulfuric acid. The place for chemical weed-killers is on the tennis courts, the gravel roads, the cobblestone gutters, the traps, the tees, and other places where no vegetation of any kind is desired but where vegetation never-

theless creeps in. For such places a good chemical poison may save much time and labor.

Sodium arsenite is by far the most common chemical employed in killing weeds. In solution it is one of the most deadly plant poisons known, and it is the basic constituent of practically all proprietary weed-killers, or herbicides. It may be purchased either in the form of a proprietary weed-killer or in the form of a dry salt, and it may also be prepared at home. Most of the commercial weed-killers are efficient, and although the cost is rather excessive yet they are convenient to have on hand and are easy to apply. The use of sodium arsenite in the form of a commercial weed-killer or in the form of a dry salt is recommended for all except the largest jobs of weed-killing. Where the area to be treated is extensive, the cost of material can be reduced one-half or more by preparing the solution at home. If the following directions are carefully followed there should be no difficulty in preparing the substance even by persons unused to handling chemicals.

The formula for preparing sodium arsenite is as follows: 2 pounds caustic soda, or 3 pounds high-grade concentrated lye; 4 pounds white arsenic; 1 gallon water. The caustic soda should be in the granular rather than the solid form. Mix the caustic soda or lye with the arsenic in a wooden, earthenware, or granite receptacle. Add the water slowly, and stir, being careful not to inhale the dust or fumes. The heat generated by the chemical reaction is usually sufficient to cause all of the arsenic to dissolve. In case some of the arsenic remains, heat the liquid until the arsenic disappears. A grayish, sandy sludge often remains in the bottom, which should be strained out if the poison is to be applied with a pressure sprayer. After the solution is cool, add enough water to replace that lost by evaporation. This stock solution will keep for several months in an air-tight receptacle. For use, dilute at the rate of 1 gallon of stock solution in 50 gallons of water.

Sodium arsenite can be applied at any time during the growing season, but best results are obtained if the first application is made in early summer at the time when the vegetation is still soft and succulent. Different manufacturers give different directions for applying the poison; but in general, a large quantity of weak solution is very much better than a small quantity of strong solution. For average conditions, where the vegetation is not over 6 inches high, 1 gallon of concentrated sodium arsenite solution, or 5 pounds of the dry salt, should be added to 50 gallons of water, and this then applied to about 3,600 square feet of surface. If the soil is very dry, it should be moistened a few hours before treatment. If the vegetation is more than 6 inches high, it should be mowed before treatment, to save material. The mowing should be done several days in advance, to allow the vegetation partly to resume growth. Either a sprinkling can or a pressure sprayer may be used for applying the solution, the latter being somewhat more saving of material. One treatment a year, in June, generally suffices for annual weeds, but two treatments, one in early June and another six weeks later, are sometimes needed for persistent perennial weeds like quack grass and buckhorn.

And dont forget this—All compounds of arsenic are deadly poisons when taken internally, and the greatest care should be exercised to avoid swallowing or inhaling them. Areas treated with sodium arsenite should not be played on by children nor grazed by animals until the poison has been washed into the soil by a heavy rain. In handling caustic soda, do not allow it to come in contact with the skin, else painful burns may result.

Next to sodium arsenite, the best all-around weed-killers are the heavier derivatives of crude petroleum. The cheapest and most easily available is the grade known as fuel oil, which is crude oil from which the kerosene, gasoline, and other light oils have been removed. Fuel oils vary considerably in composition and in their value as weed-killers. They are sold according to their specific gravity, those having a specific gravity of about 31 or 32 degrees being best for weed-killing. Fuel oil should be applied at the rate of about 6 gallons to 1,000 square feet of surface.

A number of other oils, especially the coal-tar or creosote oils, are good weed-killers, but they are much more costly than fuel oils.

Oils are used mostly on dirt roads, where they serve the dual purpose of killing weeds and keeping down the dust. They are not recommended for tennis courts or tees.

Another material which has been a popular weed-killer, and for a long time, is common salt. It is not nearly as efficient, however, as sodium arsenite or oil. Its chief field of usefulness is in combating poison ivy, a very objectionable pest with which many courses are infested. A strong salt brine, made at the rate of 3 pounds of salt to 1 gallon of water, sprayed thoroughly over the foliage about the middle of June will destroy a large number of the plants without exposing the workmen to poisoning.

A substance which will keep down all weeds except a few of the most persistent perennials, and at the same time keep the surface of a tennis court or a road in fine condition due to the tremendous capacity it has for absorbing moisture from the air, is calcium chloride. In using it, it should be mixed with the top soil, at the rate of 2 pounds to 1 square yard of surface. Calcium chloride may be purchased in bags or steel drums.

Bur Clover for Southern Fairways on Heavy Soil

By Henry P. Smith, Spring Lake Country Club, Waco, Texas

For the benefit of any of the members of the Green Section who are interested in southern golf courses where Bermuda grass comprises the fairways and greens and where they suffer from an exceedingly tight soil or soil that runs together, which is frequently the case, I can recommend the planting of bur clover in the fairways. While my education in green-keeping has been mostly in the East, where any kind of clover is taboo, nevertheless bur clover planted in the fall will grow luxuriantly, giving the fairways an attractive green appearance, and it is not thick or heavy enough to interfere with the shots through the green. This clover dies down completely by the middle of May and acts as a great stimulus to the growth of Bermuda, as it is heavy with nitrates and has a tendency to pulverize and separate the soil itself, and the Bermuda that comes up where the clover has been is much more luxuriant and healthy than the Bermuda on any of the other parts of the fairways. We planted bur clover extensively last fall and most of our fairways were about 60 per cent covered. One fairway in particular, which was almost 100 per cent covered, is now the best fairway we have; in fact, the turf on this fairway feels almost like a cushion when you tramp on it, in comparison with the hard surfaces where the clover has not been so luxuriant. There can be no doubt that bur clover is a great stimulant to the grass from a fertilizing standpoint and that it has a tendency to loosen the soil. It spreads rapidly and propagates itself. Its seed is contained in a small bur; hence its name.