



Common Bermudagrass stand on Squad "C" field, West Point 9 days after planting pre-germinated seed.



Photos by O. J. Noer

Closeup of the Bermuda on the Squad "C" field. Growth of the pre-germinated grass was excellent in spite of the cool nights.

Roundup

Pre-germination Experiment • Summer fairway renovation **By O. J. NOER**
• What to do about iron chlorosis • Trend to use of lead arsenate on tees, greens grows during year

Several clubs have used sodium arsenite at heavy rates of 30 to 35 lbs. per acre during summertime in conjunction with fairway renovation programs. Customary procedure has been to use 2,4-D or a mixture of 2,4-D and 2,4,5-T in June to kill broadleaf weeds and clover. By using them then, the interval before seeding has been sufficient to dissipate any adverse effect upon seed germination. Fairways were fertilized generously and sprayed with the heavy rate of sodium arsenite in August, and again a week later at 5 lbs. per acre. They were seeded immediately afterwards and poor, weedy, clover infested fairways were transformed into excellent turf.

Similar treatment in a spring renovation program gave equally good results at the U. S. Military Academy. The method was tried on Squad "C" practice field which was mostly knotweed, clover and had every known kind of crab grass in midsummer. The field was aerified first in several directions, spike disced thoroughly and fertilized generously. This was done in late May. The surface was sprayed with sodium arsenite at 35 lbs. per acre with about 100 gals. of water. Another 5 lbs. per acre were used a week later. The field was seeded immediately with pregerminated common Bermuda grass seed at about 80 lbs. per acre. An alfalfa and grass disc seeder was used, with seed placement $\frac{1}{2}$ -in. deep. The field was seeded in two directions on June 6, using half the amount of seed each way.

Over-all cover looked good by June 19 due to pregermination. There were no weeds of consequence, only a few scattered crab grass plants. By fall there was a good stand of turf.

A small square section was roped off and not sprayed with sodium arsenite. By mid-June it was a solid mass of knotweed. It was renovated then and the subsequent cover with Bermuda grass was satisfactory by fall.

Various formulations of disodium methyl arsenite were sold in considerable volume in 1956. Its acceptance seems best in the South, probably because discoloration of Bermuda grass is negligible at rates which effectively control many weeds. Kill of sedge has been excellent. It is said to give promise of controlling crab grass, nut grass, dallis grass and even lemon grass. If preliminary good results continue, higher cost of disodium methyl arsenate over sodium arsenite can be justified for use on green and tees. In other areas it must produce superior results to justify the cost difference because discoloration of Bermudagrass is less annoying.

The fairways at Miami Shores were badly infested with weeds of all kinds, including dallis grass, crab grass, and lemon grass. Glen Byrd started a renovation program in June of 1956 after winter play stopped. He used the following mixture to kill weeds: 2 qts. Dimet formulation of disodium methyl arsenate, 1 pt. of their wetting agent, 1 qt. Dow 40 type

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Noer — Turf Roundup

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of 2,4-D, and 25 lbs. ammonium sulphate in 100 gals. of water. This amount covered an acre. He sprayed at 5-day intervals until weed kill was complete. St. Augustine grass was killed along with other fairway weeds. Fairways were fertilized generously and some re-seeding with common Bermudagrass seed was necessary in a few areas. Results were exceptionally good.

The trend back to the use of lead arsenate on golf greens, and on tees, continued to gain momentum. Besides suppressing worms, lead arsenate helps discourage and control poa annua and crab grass. Annual applications range from 5 to 15 lbs. per 1,000 sq. ft. Several have started resumption of lead arsenate usage with two spring applications about a month apart of 7 to 8 lbs. per 1,000 sq. ft. each time. They plan to make only one application in subsequent years.

Some clubs are using lead arsenate on watered fairways again. This has been done mostly in the Midwest. Fairways here are better underfoot because of complete absence of worm casts, crab grass is less troublesome, and overall performance of grass better according to those who have charge of maintenance. Before deciding upon large scale fairway usage, the sensible plan is to make one or more trial applications on not to exceed one acre plots and be guided by results.

Pre-Germination Promising

Pre-germination of seed prior to seeding has been promising and seems like a good way to hasten turf coverage with slow to germinate grasses like blue grass and fescue. As a result of fine results obtained by C. R. Keeley at Cartier Stadium Notre Dame University, when the field was renovated in 1955, the same procedure was adopted by Colonel R. P. Reed, Jr., when he seeded the field at Michie Stadium at the U. S. Military Academy. The seed used was equal parts Merion and Kentucky bluegrass. It was mixed with twice its volume of Vermiculite and kept moist for about five days at a 70 deg. F. Seedlings appeared within four days and there was coverage in less than a month's time. The field was playable by September and was used for all games on the home schedule.

One supt. in Connecticut used pre-germinated Merion bluegrass seed on a new nursery planting. Results were excellent. His comment was that he would never again use anything except pre-germinated seed.

Tests were made in Milwaukee by John Voight. One batch of seed was placed in a cloth bag and immersed in lukewarm water for 24 hours. The other lot was mixed with two times its volume of fine ground Vermiculite and kept moist for 96 hours at room temperature. Seed was mixed with Milorganite



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to facilitate handling and was seeded into well fertilized plots of ground. Both methods produced grass quicker than on check plots seeded with ordinary seed from the same lot.

Pre-germination of hulled common Bermudagrass seed is justified in any area where day or night temperatures are apt to be below 75 deg. F. Results at the Military Academy on Squad "C" Field mentioned previously support that contention. A good stand of grass was obtained quickly even though weather was cool — too cool for best results with Bermudagrass seed. Anybody interested in testing seeded Bermudagrass for temporary summer cover in the North should use pre-germinated seed.

Moisture Important Factor

For best results with any type seed it is best to mix the seed with two to three times its volume of fine ground Vermiculite, keeping mixture moist for four to five days at a temperature of about 70 deg. F. Then it should be mixed with three to four times its volume of sewage sludge fertilizer or similar material, to dry the mix — just before seeding. Contact of seed with soil is important and can be achieved by seeding with a disc seeder or by light rolling. Surface soil must be continuously damp or moist until the new seedlings become established. The use of pre-germinated seed seems like questionable practice on areas where water is not available. The young grass sprout dries. Then it withers and dies. If attempted in an experimental way on unwatered plots of small size, the pre-germinated seed should be covered lightly, first with soil and then with straw. Evidence up to now is against pre-germination unless water is available to insure rapid growth.

Pre-germination of quick germinating seeds such as the rye grasses and the bents hardly seems justified. Usually seedlings appear within a week's time, or sometimes less. Soaking seed over night is worth trying, but there would be no saving in time with the Vermiculite method. The only advantage might be in a spell of cool weather. Even that would seem like a remote possibility.

Iron chlorosis on greens continued to plague many supts. Those who learned to recognize symptoms and applied a little iron promptly did not lose turf. Others did, and blamed leaf spot or some other disease instead of recognizing the underlying cause. Iron chlorosis is aggravated by high pH, excessive amounts of soil phosphorus and by overwetness associated with high organic content of soil.

The best way to stop iron chlorosis quickly is to rely upon absorption through the leaves. It is the one time where foliar feeding is justified. Fortunately very little iron is needed, otherwise the chemical would burn the foliage due to the necessity of using a small quantity of water — just enough to deposit the iron on the surface of the leaf.

The amount of copperas (ferrous sulphate) need not exceed 2 ozs. per 1,000 sq. ft. The amount of water should be about 5 gals. per 1,000, or approximately 25 to 30 gals. on the average size green. Late afternoon is a good time to spray. Watering-in afterwards will nullify the beneficial effect of the iron.

The new chelated forms of iron stop chlorosis, but lasting effects have been disappointing. In that respect they have been no better than ferrous sulphate on plots in Colorado. Up to now these materials have not performed on grass like they have on citrus in Florida. Until one is developed that will persist, the supt. is forced to rely on foliar feeding with ferrous sulphate. This is much less expensive. In Colorado good results have been obtained with ferrous ammonium sulphate, which is readily available there as a by-product in the recovery of rare earth metals. It contains 7 percent nitrogen in the ammonia form in addition to soluble iron. Burning is more apt to occur with it than with ferrous sulphate. That is the report of several supts. who tried the ferrous ammonium sulphate on fairways. There is very little point in using iron on fairway turf except possibly in semi-arid regions where soil reaction is very high — in the range approaching pH 7.8 to pH 8.0 or above.

A question has been raised about the continuous use of iron. Some think the cumulative effect may be bad. Most soils contain 5 per cent or more of iron, or 100,000 lbs. per acre to the plow depth. The 2-oz. rate is equivalent to 5 lbs. per acre, or about half that amount of actual iron. On that basis harm to grass from the use of iron seems unlikely. The British have used "Lawn Sand" for many years. It is a mixture of ammonium sulphate and ferrous sulphate in dry sand. Some of our fungicides contain iron as ferrous sulphate or as a chelate.

Thatch or mat is still troublesome and on the increase some places. Infrequent mowing, scalping rollers, and less frequent top-dressing are commonly blamed. In the spring of 1956 one club fertilized heavily after good growth had started. Then the green was aerified in four directions. The Verti-cut was used to break up the cores and was followed with a flexible steel mat. Mowing came next and was followed by a light topdressing of about 1/2 yd. to the green. Recovery was very rapid — in about one week. The green took water better all summer and localized dry spots were not troublesome.

"Perfect" Course

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"One eyesore ruins an otherwise perfect picture," says the Tulsa supt. "And, by the same token, sprinklers that interfere with play, shelters with roofs that are leaky