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New York Agricultural Experiment Station.

GENEVA, N. Y.

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SPRAYING TO ERADICATE DANDELIONS FROM  
LAWNS.

G. T. FRENCH.



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## SPRAYING TO ERADICATE DANDELIONS FROM LAWNS.

G. T. FRENCH.

### SUMMARY.

An experiment made at this Station during the past two years indicates that the spraying of lawns with a solution of iron sulphate for the purpose of eradicating dandelions is unlikely to be successful in New York. In 1909, a strip of lawn on the Station grounds was sprayed six times between April 23 and September 24 with a solution containing 1.5 lbs. iron sulphate in each gallon of water. In 1910, the same strip was again sprayed six times between April 15 and June 29, using two pounds of iron sulphate per gallon. In both seasons the blooming of the dandelions was almost wholly prevented and many of the plants were killed outright by the treatment. Yet, on an area of 1,000 sq. ft. there were 1,085 live dandelions in July, 1910, when the treatment had to be discontinued because of the danger of ruining the lawn. After each application (with one exception) the sprayed area was black and unsightly for several days. Apparently, the treatment did not materially injure the grass during the first season; but in the second season, with more frequent applications of a stronger solution, the grass was considerably injured.

The failure of the treatment seemed to be due to the great vitality of the dandelion roots. In one of our experiments a plant was cut off below the crown seven times and another one eight times before they were finally killed. Why spraying should succeed in some parts of the United States and fail in New York is not clear. At present, no method of spraying lawns to kill dandelions can be recommended for use in New York.

## INTRODUCTION.

In New York, the dandelion is a very common and persistent weed in lawns, and a practicable method of eradicating it is much sought. Recent experiments in North Dakota,<sup>1</sup> Rhode Island,<sup>2</sup> Iowa,<sup>3</sup> Ohio<sup>4</sup> and Colorado<sup>5</sup> have led to the recommendation of the use of iron sulphate (copperas) applied in the form of a fine spray. For North Dakota, Prof. Bolley recommends spraying the lawn, at intervals of four to six weeks throughout the season, with a solution containing one and one-half to two pounds of iron sulphate in each gallon of water. In order to determine the value of this treatment when applied under New York conditions the following experiment was made:

## OUTLINE OF THE EXPERIMENT.

In the spring of 1909 a plat 100 feet long by ten feet wide was marked off in a five-year-old lawn on the Station grounds. On this area, dandelions of two species, *Taraxacum officinale* and *T. erythrospermum*, were plentiful. The grass consisted chiefly of Kentucky blue grass, *Poa pratensis*. The soil was clay loam. During 1910 this plat was sprayed six times on the following dates: April 23, May 11, June 14, July 23, August 27 and September 24. The solution used for spraying consisted of 1.5 pounds of iron sulphate dissolved in one gallon of water. It was applied in the form of a fine spray at the rate of 50 to 65 gallons per acre by means of a knapsack sprayer. An attempt was made

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<sup>1</sup> N. Dak. Sta. Bul. 80: 565-567. March, 1908. N. Dak. Sta. Press Bul. 26. Oct. 1907 (re-edited July, 1908).

<sup>2</sup> Rhode Island Sta. Bul. 133: 55-56. April, 1909.

<sup>3</sup> Iowa Sta. Bul. 105: 289-290. July, 1909.

<sup>4</sup> Ohio Sta. Cir. 102:5. May, 1910.

<sup>5</sup> Letter from B. O. Longyear, Colorado Expt. Station, April 6, 1910.

In this letter Prof. Longyear states that he has had success by using a 15 per ct. solution of iron sulphate (1¼ lbs. per gallon, in water and applied in the form of a fine, forcible spray with a bucket spray pump. Three applications, beginning about the first of August and made three weeks apart entirely cleared the experimental plats of all dandelions.

to spray on sunshiny days two or three days after cutting and to avoid mowing sooner than two or three days after spraying, as directed by Prof. Bolley.

The following spring a majority of the dandelion plants were still alive and, apparently, vigorous. Accordingly, for the season of 1910, it was decided to use a stronger solution, viz., one containing two pounds of iron sulphate in each gallon of water, and to spray more frequently. Six applications were made between April 15 and June 29 at intervals of 11 to 18 days.

## DETAILS OF THE EXPERIMENT IN 1909.

### FIRST SPRAYING.

The first spraying was made on the afternoon of April 23 previous to the first mowing of the season. Considerable foliage of both dandelions and grass had already been produced but there were no blossoms. There was no rain of importance until April 27, four days after the spraying. On the second day following the treatment the sprayed plat presented a black, unsightly appearance. Not only were the dandelion leaves blackened, but also the tips of the grass leaves. The discoloration was more persistent this time than after most of the other sprayings. It did not entirely disappear until the 10th of May, seventeen days after the spraying. This application was not as effective as most later ones, still a large part of the foliage of each plant died and many grass leaves were killed. Just why this spraying was not more effective is not clear, but it was probably due in part to the thick foliage, which prevented the lower leaves of some plants from being thoroughly covered with the spray. The weather was cold until the first week in May so that neither grass nor dandelions made much growth. Before the second spraying, however, considerable foliage had been formed again and though the plants outside of the sprayed plat were larger, those in the treated area were rapidly regaining their normal condition.

## SECOND SPRAYING.

The second spraying was made on May 11, eighteen days after the first. The dandelions had made so much growth that it appeared as though a treatment at this time would be more effective than later. The day following the treatment the leaves were covered with small, whitish spots and were somewhat withered but very few had turned dark. On the 13th, the area, as a whole, looked quite dark, but on close inspection some portion of the leaves on nearly all of the plants was green. On the 14th, however, the plants were quite black and the greater part of the foliage was dead. At this time, a few large plants and most of the flower buds appeared to be but little injured. Nevertheless, fewer than a dozen of these buds developed on the entire plat, while the plants on the adjoining lawn were full of blooms. There is no doubt that spraying at this time prevented blooming, but it did not seem to lessen the ability of the roots to send out new leaves. The sprayed area never assumed the black appearance which followed the first spraying. The weather being warm, a rapid growth of grass and dandelions took place, and by May 17, only four days after spraying, the plat was again fresh and green.

## THIRD SPRAYING.

This application was made on June 14, four weeks after the second. The lawn was mowed on the 12th and no rain fell until the 18th. The dandelions were nearly all killed to the ground, but a few leaves, spotted with green, remained alive. On the 18th new leaves were showing and on the 23d of July, the date of the fourth spraying, the dandelions were thrifty and green but the plat was noticeably brown. The soil was quite dry at this time and the grass had grown but little. The dark color gradually shaded into brown and green but the greenish-brown color of the sprayed area was quite noticeable at the time of the fourth spraying.

## FOURTH SPRAYING.

On July 23 the plat was sprayed for the fourth time. A heavy rain occurred during the following night, and though the dark

color followed, the dandelions always showed considerable green foliage. The plat was not sprayed until 5 p. m., and it is probable that the heavy rain washed off the material before it had time to react fully. After this spraying the dandelions recovered rapidly but the grass continued yellow. The adjacent lawn was also in a dried condition, and this seemed to indicate that drought, rather than spraying, was the main cause of the yellow color of the grass blades. The sprayed plat continued quite dark up to the 27th of August, the date of the fifth spraying, but there was no apparent difference in the vigor of the dandelions in the sprayed and unsprayed lawns.

#### FIFTH SPRAYING.

The fifth spraying was made on the 27th of August; it resulted in killing most of the dandelion tops and in blackening the entire area. The drought continued until after the sixth spraying so that the grass remained in a dried condition and the dark color persisted. On the 20th of September the dandelions had formed large tops again and a few seeds, but many more seeds were produced on the unsprayed lawn.

#### SIXTH SPRAYING

This spraying, the last of the season, was made on September 24. It killed practically all of the dandelion tops, though the lower leaves of a few large plants remained green; the others turned black but gradually recovered as in previous sprayings. Most of the plants went into the winter with some foliage.

#### DETAILS OF THE EXPERIMENT IN 1910.

It was apparent on April 15, 1910, previous to making the first application of the season, that the past year's spraying had not resulted in killing nor in seriously injuring the old, well-established plants. It is probable that some younger plants had been killed, for the sprayed area contained fewer plants than the unsprayed lawn on either side.

This difference, though, was not marked. The only striking difference apparent at this time was that the blossoms on the unsprayed plants were several days earlier than those on the sprayed area. The grass on the sprayed area showed no injury.

This year the same sprayer and methods were used as in the previous season's work. The strength of the mixture, however, was increased from 1½ pounds of iron sulphate per gallon of water to 2 pounds per gallon, and in three of the six sprayings the plat was given a double application, so that more sulphate was used for a given area, and each plant received a more thorough coating of spray. The applications were made two weeks apart instead of four.

Until the last of this season's spraying there is very little to add to our observations made after each spraying in 1909; a detailed statement of the effects of each spraying during 1910, therefore, is not necessary, and only a few main points will be mentioned. The black color always followed spraying and most of the dandelion foliage was killed, but the central bud of most plants usually escaped serious injury.

The first spraying was made on April 15, two days after the lawn had been mowed for the first time and just at the beginning of the blooming season. The second spraying followed two weeks later, April 30, when a double application was made; the second application being applied in an opposite direction from the first. The foliage seemed to be more thoroughly killed by this double application but the roots were still vigorous, and new tops were produced just as in previous treatments.

It was noticeable at this time that none of the plants on the sprayed area had bloomed, while the adjacent unsprayed lawn was yellow with blossoms; also, the foliage was much thinner on the sprayed area. This latter difference was due in part to the absence of a rank growth of dandelion leaves, but it is probable also that some grass blades had been killed by the spray.

The third spraying, applied on May 11, was a double one and resulted in killing most of the dandelion foliage though it was no more effective than the previous one.



The fourth spraying was made on May 28; only a single treatment was given because the grass foliage was noticeably thin, and we did not care to risk killing it entirely. The dandelion foliage was not as effectively killed by this application as when a double spraying was made. Quite a heavy rain fell on the day following this spraying and probably reduced somewhat its toxic action on the leaves.

The fifth spraying, a double application, was made on June 15; the leaves were well killed, but five days later considerable new foliage had developed.

The plat was given a sixth spraying on June 29. This was a single application, but the grass had been cut on the previous day, so the foliage was well covered. It was quite apparent at this time that the grass on the sprayed plat had been injured; little growth had been made since the previous spraying, and the plat was so dark that no guide lines were necessary to keep within the bounds of the plat. Some of the dandelions also had failed to produce foliage, and by comparing sprayed and unsprayed areas it was apparent that there were many more dandelions on the lawn adjacent to the sprayed plat. The dandelions remaining on the sprayed plat were small, but it seemed probable that there was still plenty of vitality left in the roots, which, if given an opportunity, would produce fully developed and normal tops. This treatment, like the previous ones, caused a decided blackening of the lawn and killed most of the dandelion foliage. On the 6th of August the grass was at a standstill and the plat was still dark, but the dandelions were again recovering. It was apparent after this treatment that the dandelions had been partly killed out, but it was also certain that these treatments, if continued, would kill the grass before the season was over. Therefore, it was decided not to spray again for the present; at least not until the grass had recovered enough to warrant it. After the last spraying the dandelions on the sprayed area were counted; and 1,085 plants were found alive on 1,000 square feet of lawn.

Since no more spraying was done during the season nothing further can be reported at this time, but the investigation is to be continued.

## VITALITY OF THE DANDELION ROOT.

The dandelion root, when the plant is once established, stores up a large amount of reserve food, is very hardy and extremely persistent.

Prof. Bolley,<sup>6</sup> after making several cutting tests on old and young dandelions in North Dakota, has the following to say concerning the vigor of the roots: "Any part of the root below the ground, when in a normal state, will send up new plants after being cut off. Plants readily send up shoots from roots that were cut three and four inches below the surface. The more often they are cut off the weaker become the offshoots."

Observations made by Munson in Maine<sup>7</sup> show that the dandelion root, after having the tops removed, will in time send up from one to six new crowns, so that in many cases, and especially where lateral roots are severed from the main root, more plants result than would have been the case if the tops had remained uncut.

From our own observations it seems certain that continued cutting checks leaf growth but that the root continues to live after the top has been removed several times. The following experiment was made to learn just how many times the tops can be removed below the crown without killing the root: In a lawn on the Station grounds, two large plants were selected and marked with stakes. The tops of these plants were removed just below the crown, and all growth that appeared above ground thereafter was removed, usually, just as soon as the leaves unfolded. At no time were the leaves allowed to make more than four inches of growth. The first cutting was made on May 2, the eighth and last one on July 12. Under this treatment one of the roots continued to send up new leaves until the seventh cutting; the other lived until the tops had been removed eight times. After this both roots apparently died; at any rate no further growth appeared during the season. From the above observation we may conclude that on very small lawns, frequent and continued cutting

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<sup>6</sup> N. Dak. Sta. Bul. 80: 564-567. March, 1908.

<sup>7</sup> Maine Sta. Bul. 95: 109-113. Sept., 1903.

may be effective and perhaps practicable, but on large lawns it is apparent that such treatment is entirely inadequate, at least in this region.

The above experiments seem to explain, also, the reason for the failure of spraying to kill the larger dandelions. Spraying merely kills the leaves. The only effect on the root is to starve and weaken it in exactly the same way that frequent, close cutting of the leaves weakens it. Plants which can survive six or seven cuttings can surely stand as many sprayings and probably more, because spraying does not remove the leaves so completely as was done in our cutting experiments.