Viruses of Red Clover in Wisconsin

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BEFORE launching a breeding program to develop varieties of red clover (*Trifolium pratense* L.) resistant to viruses, it is necessary to know the kinds and relative importance of the viruses in areas where the new varieties will be grown. Few such surveys have been made because they are very time-consuming. Virus diseases of clovers cannot be adequately distinguished on the basis of symptoms alone. Symptoms incited by different viruses overlap, and two or more viruses may be present concurrently in a plant. This means that surveys must include host range and other tests.

One of the first virus surveys of clovers was made by Pierce (10) who reported that of 28 naturally-infected red clover plants collected in Idaho in 1935-36, 19 were infected with pea common mosaic virus (PCMV), 5 with bean yellow mosaic virus (BYMV), 3 with alfalfa mosaic virus (AMV), and 1 with white clover mosaic virus (WCMV).

Diachun and Henson (2) found BYMV the most common virus in red clover in Kentucky; in 1 field nearly 75% of the plants showed virus symptoms.

In 1963 Langelüddecke (7) reported results of a 2-year investigation of viruses of clover in fields and nurseries in Bavaria. Virus incidence was too low to be important in the fields, but up to 11% of the plants in nurseries were infected. Of 49 plants collected from fields, 45 had 1 virus each (18 had AMV, 14 had PCMV, and 13 had a virus inciting green-petal symptoms) and 4 had 2 or more viruses each. Of 37 red clover plants collected from nurseries, 12 had only PCMV, 2 had only AMV, 1 had only red clover vein-mosaic virus (RCVMV), 4 had only the green-petal-inciting virus, and 18 had 2 or more viruses each.

From 1958 to 1960, Goth (4) surveyed 76 red clover fields throughout Minnesota and estimated that 20 to 50% of the plants in 60% of these fields were virus-infected. He identified the viruses in 120 naturally-infected plants and determined that 38% had BYMV, 18% had RCVMV and pea streak virus (WPSV), 15% had both RCVMV and AMV, and 10% had pea mosaic virus.

The first survey of viruses of red clover in Wisconsin was made in 1949-51 by Hansen and Hagedorn (5). Of 49 plants assayed, RCVMV, PCMV, BYMV, WPSV, ACMV, and AMV were isolated from 31, 29, 24, 8, 6, and 2% of the plants, respectively. Graves (5) and Graves and Hagedorn (4) later reported that RCVMV was the most prevalent virus of red clover in the major pea-growing counties of Wisconsin with an incidence ranging from 7 to 28%.

The objectives of this investigation were to obtain additional information concerning the relative prevalence and distribution of viruses in red clover in Wisconsin to improve methods of identifying them.

MATERIALS AND METHODS

Survey Procedures

**Sampling.** Samples were collected over a 3-year period from red clover grown in Wisconsin. In 1961 all samples came from one 2-acre field of 15-month-old 'Lakeland' located near Madison. In 1962 they were gathered from many fields in Dane county, and in 1963 they were collected from all red clover-producing areas of the state. Thirty-nine, 56, and 117 plants were assayed in 1961, 1962, and 1963, respectively. Only plants with symptoms were assayed.

Leaves were used as inoculum in all cases. In 1961 these were cut from standing plants in the field and placed in labeled petri dishes lined with moist filter paper. A separate sterilized razor blade was used for each plant. Inoculations on differential hosts were made the day of collection. In 1962 and 1963 surveys it usually was not possible to inoculate on the day of collection.

**Materials and Methods.**

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