A possible new downy mildew syndrome on buckwheat seedlings

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Stunting of buckwheat seedlings was observed for the first time in 1982. Other symptom expressions observed were small stem diameter, leaf mottling (interspersion of light and dark green areas), and rugosity of some leaves. These symptoms may be the result of seed-borne systemic infection by the downy mildew pathogen *Peronospora ducometi*.

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En 1982, le rabougrissement des plantules de sarrasin accompagné de symptômes tels que des tiges de petit diamètre, des feuilles mouchetées (mélange de région vert foncé et vert pâle) et des feuilles rugeuses fut observé pour la première fois. Cet ensemble de symptômes peut être causé par une infection systémique de *Peronospora ducometi*, qui serait transmis par la semence.

Since its reporting in 1978 (8), symptoms of downy mildew of buckwheat in Manitoba, caused by *Peronospora ducometi* Siemaszko & Jankowska, have been observed almost exclusively on the leaves. The symptoms observed included chlorotic local lesions averaging 20 mm in diameter, large irregular chlorotic areas (probably the result of coalescing local lesions), and mottling usually extending throughout most of the leaf blade (Fig. 1a). The color of the infected areas of the leaves generally was a light green. Necrosis occurred in some of the circular local lesions. Reports from other countries of downy mildew on buckwheat also referred only to a foliage phase of the disease (1, 2, 3, 6, 7).

Local lesion symptoms have occurred most often on those leaves located between the middle and upper parts of the affected plants, whereas, mottling or mosaic-like symptoms appeared on those leaves nearer to the top of the plant. Occasional stunting of some upper branches was observed during periods of severe foliage infection (8).

Stunting of buckwheat plants in the seedling stage was observed for the first time in 1982 in field plots at the Morden Research Station (Figs. 1b and 1c). The degree of stunting varied substantially, with severely stunted plants being overgrown by adjacent healthy plants. Other seedlings appeared healthy until a more mature growth stage when mosaic or mottling and rugose symptoms appeared on the upper leaves (Fig. 1d).

Observations to determine the incidence of stunted buckwheat plants were made on several tests on the station. Seed of the cultivar Mancan, produced at the Morden Research Station in 1981, was used in these tests. Two tests planted on May 28, and examined 35-49 days after seeding, contained levels of 3.4% and 15.7% stunted plants. There was little evidence of local-lesion infection at this time. The average ambient daily temperature during the 7-day period following the May 28 seeding dropped to a low of 9°C by May 31 and then rose slowly to 17°C by June 4. In other tests seeded June 1 and June 11, stunted plants were either not evident or were present at a level of less than 1%. The average ambient daily temperature during the 7-day periods following the June 1 and June 11 seedings rose to highs of 18° and 20°C, respectively.

From the results of these observations, it appears that the higher ambient temperatures of 18° and 20°C following seeding may have resulted in fewer stunted plants. This was similar to the findings of Lehman (5) for downy mildew of soybean. He observed that the rapidity of germination of oospore encrusted soybean seed affected the percentage of seedlings infected systemically with *Peronospora manshurica* (Naoum.) Syd. Encrusted seeds planted in cold soil (13°C) gave rise to 40% seedling infection, whereas no systemic infection occurred at 18°C and above.

To determine if this was just a local problem or one of more widespread importance, a survey of several commercial buckwheat fields in southern Manitoba was conducted in early July. Stunting, at levels of 1-10%, was observed in 4 of 7 fields examined.

The etiology of stunting of buckwheat plants was not determined. It seems probable that the symptoms observed were the result of systemic infection from seedborne inoculum. Seed transmission of buckwheat downy mildew has been reported from Russia (6). From the results of surveys in 1979 and 1980, which covered the commercial buckwheat acreage in Manitoba, it would appear that downy mildew also is seedborne in Manitoba. It was found in all fields examined, even in fields where buckwheat had not been grown before.

The effect of systemic-like infection on yield was not determined. It appeared, however, that the yield of such plants would correlate negatively with the degree of stunting.

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Literature cited

1 Dubinevich, B.N. 1961. Diseases of buckwheat. Zashch. Rast. Moskova 6:25-26. (Rev. Appl. Mycol. 40:690, 1961).

2 Dudka, I.A. and L.I. Burdjukova. 1978. On distribution of

Peronospora ducometi Siem et Jank. an agent of buckwheat peronosporosis in the Ukranian SSR. Ukrainskii Botanichnii Zhurnal 35:411-412.

3 Jankowska, K. 1929. Onowych dla Polski Chorobach roslin uprawnych. (Notes on diseases of cultivated plants new to Poland). Reprinted from rocznicki Nank Rolniczych i Lesnych (Yearb. Agric. Sylvicult. Sci.). Poznan 21. 10 pp. (Rev. Appl. Mycol. 8:422-423. 1929).

4 Hildebrand, A.A. and L.W. Koch. 1951. A study of systemic infection by downy mildew of soybean with special reference to symptomatology, economic significance and control. Scientific Agriculture 31:505-518.

5 Lehman, S.G. 1953. Systemic infection of soybean by *Peronospora manshurica* as affected by temperature. Elisha Mitchell Sci. Soc. J. 69:83.

6 Savitskiy, K.A. 1970. Grechika (Buckwheat). Moscow: 'kolos'. 312 pp.

7 Tanaka, I. 1934. Eine neue Art des falschen Mehltaupilzes auf dem Buchweizen. (A new species of the downy mildew fungus on buckwheat). Trans. Sapporo Nat. Hist. Soc. 13(3):203-206. (Rev. Appl. Mycol. 13:762. 1934).

8 Zimmer, R.C. 1978. Downy mildew, a new disease of buckwheat (*Fagopyrum esculentum*) in Manitoba, Canada. Plant Dis. Reptr. 62:471-473.

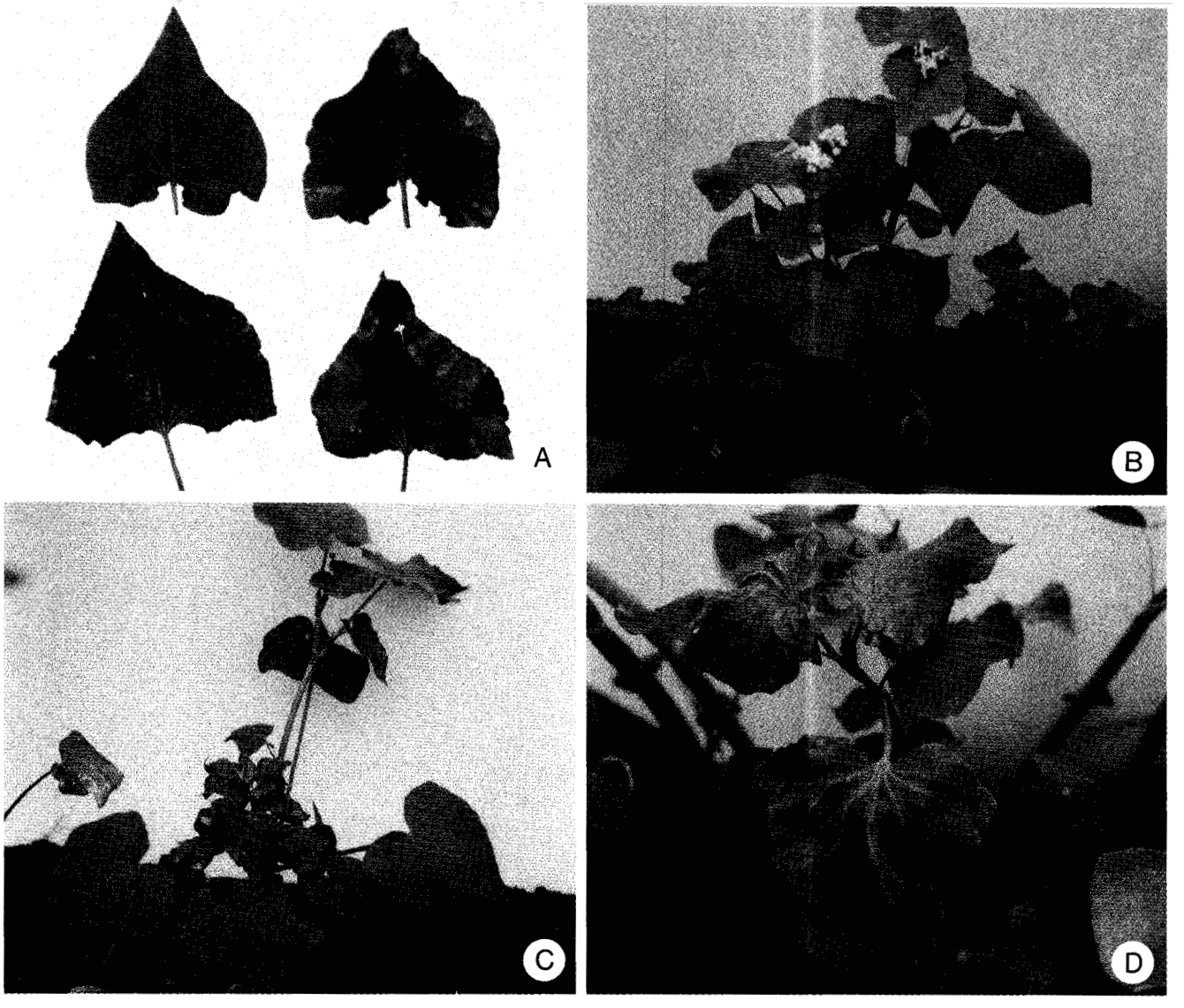

Figure 1 (A to D). (A) Local lesion infection — upper and lower right leaves show circular-like lesions, a number of lesions in the lower right leaf have necrotic outer rings; lower left leaf has coalesced circular chlorotic lesions; and the upper left leaf exhibits a few darker green areas (normal leaf tissue) amongst the lighter green chlorotic infected tissue. **(B)** Two normal plants in the center flanked by infected plants showing, stunting, faint mosaic, rugosity of leaves and small leaves. Flowering of infected plants was suppressed almost entirely. **(C)** Systemic-like infection in which one stem of the plant was stunted and leaves slightly rugose and mosaic, other stem and leaves appeared healthy. **(D)** Systemic-like infection showing a mottling type infection pattern which may fan out from the base of the leaf to all areas of the leaf. Rugosity of the infected leaves was pronounced. The plant was stunted to some degree.