back to the arid portions of the southern Great Plains.[3] Observations of forest-fire smoke also give reliable information of air movements over long distances, as in October, 1918, when Minnesota smoke was observed throughout the eastern half of the United States except along the gulf and south Atlantic coasts.[4] Observations on clouds may be complementary to those on pilot balloons, for the usefulness of pilot balloons decreases as the cloudiness increases. How cloud movements may be used in local weather forecasting has been discussed by A. H. Palmer for San Francisco, M. L. Fuller for Peoria, Ill., and H. H. Martin for Columbus, O.[5]

AIRPLANES AND THE WEATHER

An article on the "Effect of winds and other weather conditions on the flight of airplanes"[6] is a rather extensive, though by no means complete, compilation and discussion of aviators' meteorological experiences. To quote from the synopsis:

The disturbances of the air due to daytime convection are one of the prime sources of bumpiness. Especially on hot summer days do strong, rapidly rising currents of air penetrate to great altitudes and, where encountered, jolt the airplane. Where the cooler air is descending, the effect is similar to that of falling into a "hole." The height to which the effects of surface roughness extend when the wind is blowing depends upon the speed of the surface wind and the height of the obstruction.

In the free air, aviators' observations show how the layers of air flow over one another, the interface sometimes being marked by clouds and sometimes entirely invisible. At such levels are encountered billows or waves, and considerable difficulty is sometimes experienced in flying through such regions. Clouds, rain and fog all contribute to the discomfort and danger of flying.

Perhaps the most interesting are the experiences in the thunderstorms and the up-and-down winds which accompany such storms. As the driving wedge of cold air at the surface advances ahead of the storm, the air into which the storm is moving is forced upward. The maximum turbulence is found in the region of the squall cloud, but the force of the rising air ahead of the storm is sufficient to carry up an airplane considerably, in spite of the efforts of the pilots to keep the nose of the plane down. The dangers from lightning and hail, are also quite as important as those from the capricious winds.

There is an annotated bibliography at the end. This article bound with two on ballooning and with reviews of Y. Henderson's "Physiology of the aviator," and H. Luckeish's "High lights of air travel," may be had on application to the Chief, U. S. Weather Bureau.

Charles F. Brooks

[3] See Winchell and Miller, *Mo. Weather Rev.*, November, 1918, Vol. 46, pp. 502–506.

[4] *Mo. Weather Rev.*, November, 1918, pp. 506–509.

[5] *Mo. Weather Rev.*, September, 1918, pp. 407–413; July, 1919, pp. 473–474, and August, 1919, pp. 567–570. A limited supply of separates is held by each of the authors named: address, "Weather Bureau Office" at cities named.

[6] *Mo. Weather Rev.*, August, 1919, pp. 523–532, 10 figs.

SPECIAL ARTICLES

A PRELIMINARY NOTE ON FOOT-ROT OF CEREALS IN THE NORTHWEST

During the first half of May, 1918, the Station Entomologist was called to Olympia, Wash., to consult with the farmers and county agent concerning an outbreak of aphis on wheat. He found that the aphids were not responsible for the whole trouble and submitted samples of wheat from the unthrifty fields to the station plant pathologist for diagnosis. Subsequently specimens showing the same disease were submitted from this and other localities in western Washington through the county agents of the respective counties.

Among the first lot of plants were some showing lesions at the base of the stem. These lesions were elliptical, light-centered, penetrating the leaf-sheath and the surface of the stem. Plants with these lesions and others with a general blackening of the lower nodes showed death of the roots at the first node, the plant attempting to make good this loss by putting out roots at the second node. In some plants two sets of roots had been successively killed and roots had been put out at the third

node. Affected plants were sickly in growth, yellowish in color and showed little or no stooling.

Later reports, especially from Cowlitz County, showed that the disease was responsible for uneven stand in the field with considerable lodging, the stems breaking over near the surface of the ground. As reported the disease showed no relation to type of soil or system of culture. The disease also appeared on oats and barley but in less severe form and showed more of a general blackening of the base of the stem and death of roots.

The disease was reported from Cowlitz, Snohomish and Thurston counties on wheat with the greatest severity in Thurston county, while it was reported from Cowlitz county as causing most injury to maturing grain. Reports of the disease on barley were received only from Pierce county. On oats the disease occurred in Clarke, Pierce and Snohomish counties. The wheat crop in certain localities of Cowlitz and Thurston counties suffered material injury while no data are at hand to show that the disease caused any material damage to the other cereals.

In 1902 Cordley[1] reported a foot-rot of cereals in Oregon but gave only a brief description of the disease and did not determine the causal organism. The disease he mentions is undoubtedly identical with the disease which appeared during 1918 in western Washington. No other occurrences of the disease in the united States are recorded. The disease is either a newcomer or has escaped general notice up to the present time.

A very careful microscopic study of the fungus found in the stem lesions was made in the attempt to determine the fungus. The mycelium was sterile, dark brown in color, with constrictions at the origin of side branches. The mycelium agreed fairly well with *Rhizoctonia solani* Kuhn., except in the diameter of the hyphæ which were only about half as large. In case of plants showing a very pronounced blackening at the base of the culm it was found that this was due to a very compact surface growth of dark brown hyphæ, approaching in some cases almost to a sclerotial formation.

No fruiting stage of the fungus has as yet been connected with the sterile stage on the base of the culms. Until this is done we can only compare symptoms, and vegetative characters of the fungus with published descriptions of foot-rot diseases of cereals. There seems to be a very close similarity between the disease as it occurs in Washington and the foot-rot of cereals caused by *Ophiobolus graminis* Sacc., as described by McAlpine[2] and others.

Ophiobolus graminis and other foot-rot fungi are known to produce an ascigerous stage on old stubble, so it seems probable that the fungus causing the foot-rot of cereals in western Washington will be found to have a perfect or ascigerous overwintering stage on the stubble of affected plants. There is also a possibility of the disease occurring on the native grasses. It is on these wild hosts that some of the foot-rot fungi are known to be carried through a crop rotation. It has not been possible to make a careful field study for the discovery of the ascigerous stage. In the limited work undertaken a species of *Pleospora* is the only perithecial form that has been found in the old wheat culms. It is not yet possible to say whether the disease in Washington is identical with any of similar European or Australian diseases.

Reports indicate that the disease is already rather widely distributed in western Washinging and Cordley's account of the disease would indicate that it may have been present for a considerable time. Time alone will determine whether the disease will become as serious as the foot-rot diseases of cereals in Europe and Australia have been.

B. F. DANA,
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[1] Cordley, A. B., Ann. Rpt. Ore. Agr. Expt. Sta., 1912, pp. 66–67.

[2] McAlpine, D., "Take-All and White Heads in Wheat," Bul. Dept. Agr. of Victoria, 9: 1–120, 1904.