Characteristics of Soils Adjacent to the Mackenzie River in the Northwest Territories of Canada

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The observations reported in this paper were made during an exploratory soil survey traverse of the Mackenzie River Valley between August 2 and September 8, 1945. These observations are supplemented by chemical analyses of some of the soil samples collected at that time. Examination on soils were made only along or within a few miles of the river and no portion of the valley was investigated in detail.

The Mackenzie River drains Great Slave Lake (Fig. 1) with its source at N. Lat. 61° 03', W. Long. 116° 30' and empties into the Arctic Ocean about N. Lat. 68° 50' W. Long. 135° 33'. The total length of the river is about 1,050 miles, a third of which lies north of the Arctic Circle. For the first 200 miles of its course this river flows westward through the northernmost part of the Great Plains. Striking the front range of the Mackenzie Mountains at Camsell Bend, it flows northward through a mountain valley for about another 200 miles. Then the mountains gradually recede from the river and it flows through a northern plain until it reaches the sea. The altitude of the plains along the river is not great and none of the lands traversed had an altitude above 500 feet.

Climate

Available climatic data show that the Mackenzie River Valley has low precipitation, long cold and short, but comparatively warm, summers. Summarized climatic data for four stations are given in Table 1.

While the differences in climate between stations in the Mackenzie River Valley are small, there are several rather striking regional differences in vegetation and soils in the area. As judged from the nature of the vegetation and soils on the lands adjacent to the river, three distinct zones occur. These may be designated as the Grey Wooded Zone, the Sub-Arctic, and the Arctic Zones.

The Grey Wooded Soil Zone is in reality a transition zone between the true Grey Wooded Zone to the south and the Sub-Arctic Zone to the north. It closely coincides with the northerly extension of the Great Plains. It is transitional because, while the azonal and zonal soils are free of permafrost, many of the peaty soils of the region are frozen at a comparatively shallow depth. Fort Simpson is near the northern limits of this zone.

The Sub-Arctic Zone extends from Camsell Bend near latitude 62 to about latitude 68 and includes Fort Norman and Fort Good Hope. While this region is forested, permafrost is present in practically all the soils.

The Arctic Zone extends from about latitude 68 to the ocean and includes the settlement of Aklavik. This is the tundra region, although trees are present on the delta soils. Permafrost is found at great depths in all soils except those subject to annual flooding.

Vegetation

The river bottom lands are heavily wooded in about 20 or 30 miles from the ocean. Spruce is the dominant tree on the lands not subject to annual flooding. Black poplar is plentiful in the southern zone but becomes scarcer toward the north, and a small grove was found north of the limits for spruce on the Mackenzie delta. Aspen or white poplar is present in local areas in the southern zone but is scarce in the Sub-Arctic Zone and is not present in the Arctic Zone. Willows and alders are found in the river bottom soils and are the only trees growing in the tundra region.