Effects of geology on differentiation of phytogeocoenoses in the Subarctic environment of Yukon Territory, Canada

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In the northern Yukon Territory, Canada, vegetation is generally represented by extensive treeless tundra reflecting the frigid environment of the Subarctic. However, unusual occurrences of small forest patches of {i}Picea glauca{i} (white spruce) are noted in some places there. Field investigation revealed that occurrences of the forest patches were strictly associated with south-facing slopes of oflimestone substrates. On north-facing slopes and habitats where substrates consisted of non-calcareous geology such as argillite, treeless tundra developed extensively to represent the zonal phytogeocoenosis in the region. Floristic structure of vegetation was very different due to geological substrates. For example, {i}Carex scirpoidea, Tofieldia pusila, Androsace chamaejasme{i} and {i}Parrya nudicaulis{i} occurred only in the limestone habitats whereas {i}Vaccinium vitis-idaea, Ledum palustre{i} and {i}Empetrum nigrum{i} in the argillite habitats. {i}Picea glauca{i} was found only in the south slopes of limestone substrate. Soil analyses showed that chemical characteristics were very different due to the geology. Soils derived from limestone substrates exhibited high base status (pH 7.0-8.9, base saturation 71-217%), while those of argillite origin showed much low base status (pH 4.5-5.0, base saturation 6-24%). In addition to this, soils of limestone substrates exhibited well developed deep horizons and generally better drainage, whereas soils of argillite origin shallow profiles and poor drainage. Such differences in soil characteristics seemed to have determined floristic characteristics of the vegetation eventually to substantiate vegetation differences, in particular tree occurrence. In this manner, the occurrences of forest patches in the Subarctic environment of the northern Yukon Territory seemed to ba an outcome of the unique combination of limestone geology and south slope aspects. The forest patches in the region, therefore, may be regarded as an 'intrazonal' phytogeocoenoses.