

## GROWTH FORM OF *CAREX BIGELOWII* GROWING IN SOUTH-CENTRAL ALASKA (EXTENDED ABSTRACT)

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*Carex bigelowii* is a rhizomatous perennial growing mostly in mountains in the circumpolar region (HULTÉN, 1968). Several buds are formed by lateral meristems in the leaf axils on the tillers. Usually only one or two buds will develop into daughter tillers, the rest will remain dormant (JÓNSDÓTTIR and CALLAGHAN, 1988). *C. bigelowii* shows various growth forms among habitats (HULTÉN, 1968). The purpose of this study is to clarify characteristics of the growth form of *C. bigelowii* with respect to shoot size and rhizome size among habitats. Furthermore, it is to clarify the role of rhizomes and roots as a storage organs for non-structural carbohydrates.

The study site was located on the timberline of a mountain at about 650m above sea level near Anchorage in south-central Alaska. The mountain slope was mainly covered by prostrate woody plants, such as *Empetrum nigrum*, *Vaccinium* sp. The foot of the slope was covered by mosses, such as *Sphagnum* sp. There were small stream and wet land vegetation was developing. Some vascular plants such as *Eriophorum* sp., *Carex* sp. and *Dryas octopetala* were also growing there. The top of the slope was bare ground. *Dryas octopetala* was dominant there. Some woody plants such as *Salix* sp., *Betula* sp., *Vaccinium* sp. and *Cornus* sp. *C. bigelowii* were widely growing along the slope. The growth form of *C. bigelowii* varied with habitat conditions. They were caespitose on bare ground and were not caespitose on the slope and on wet ground.

Measurement of shoot size and rhizome size of *C. bigelowii* was carried out on the three habitats, bare site, slope site and wet site. To analyze total non-structural carbohydrates (TNC), rhizomes and roots of *C. bigelowii* were removed and were dried at 80°C for 48 hours. TNC concentrations were assessed using the modified Somogyi-Nelson colorimetric method described by MASUZAWA (1977).

Shoot length of *C. bigelowii* was largest,  $35.9 \pm 1.4$  cm, on the bare site. The smallest value of  $24.0 \pm 1.1$  cm was observed on the wet site (Fig. 1a). Rhizome length was largest ( $29.7 \pm 3.7$  mm) on the wet site and was smallest ( $17.5 \pm 1.3$  mm) on the bare site (Fig. 1b). TNC concentration of rhizomes and roots are shown in Fig. 2. Starch concentration was not measured. Therefore, only total sugar concentration is shown. Roots sampled from the wet site showed the

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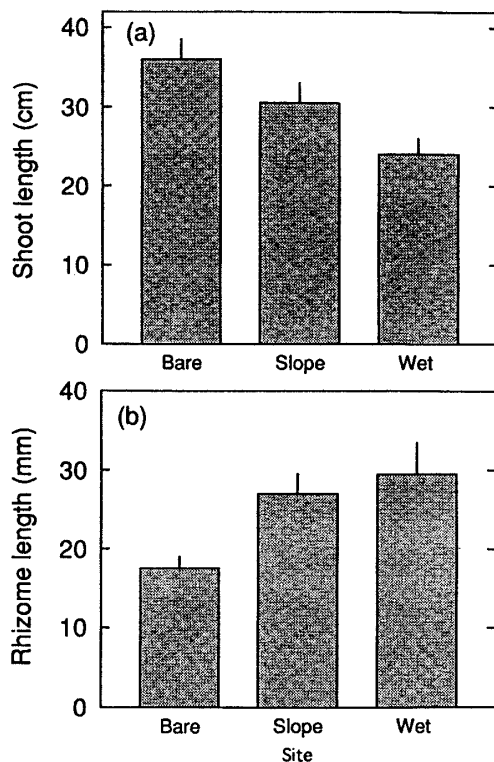


Fig. 1. Shoot length (a) and rhizome length (b) of *Carex bigelowii*. Vertical bars indicate the upper limits of 95% confidence intervals.

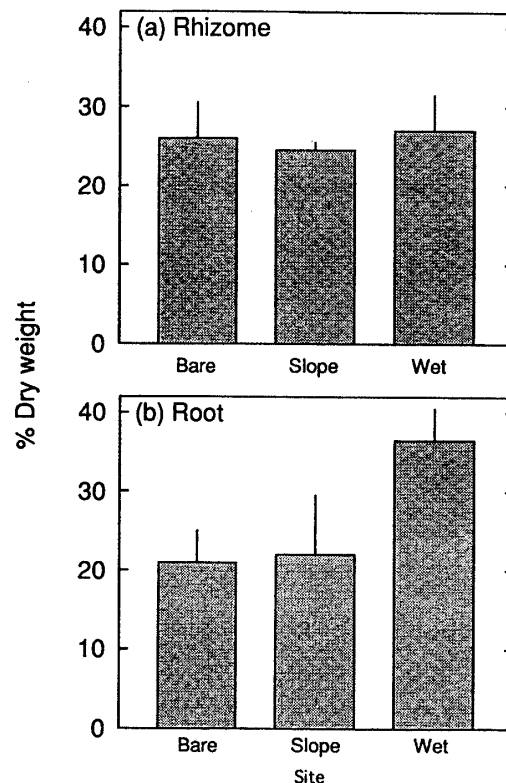


Fig. 2. Total sugar concentrations in rhizomes (a) and roots (b) of *Carex bigelowii*. Vertical bars indicate the upper limits of 95% confidence intervals.

highest total sugar concentration,  $36.6 \pm 3.8\%$  dry weight, while lower concentration was obtained from the bare site and slope site (Fig. 2b).

In perennial plants, surplus carbon may be stored and then utilized during periods when there is high growth demand (MOONEY, 1972). *C. bigelowii* was growing with its longer rhizome and only 3 to 4 generations of tillers in the wet site with sufficient water. Decomposition of dead organs may progress more rapidly under such a condition. Higher concentration of total sugar in roots (Fig. 2b) may be an efficient way to store carbohydrates in small underground parts. *C. bigelowii* was growing with larger shoots on the bare site (Fig. 1a). Generally, under exposed conditions, the growth form of plants tends to be compact (CRAWLEY, 1986). In this study, the contrary result was derived in relation to the shoot size. Rhizome length is smaller than at other sites (Fig. 1b). It is supposed that the smaller rhizome length contributes to their stiff tussock structure. The slope site showed intermediate characteristics among the three sites.

#### Acknowledgments

The authors are greatly indebted to Dr. B. SVEINBJÖRNSSON, professor of University of Alaska, Anchorage, for his field support.

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(Received July 7, 1993; Revised manuscript received August 26, 1993)