North American prairie marshes during periods of drought (WELLER and SPATCHER 1965, WELLER 1978, 1982, VAN DER VALK and DAVIS 1978a,b, 1979, VAN DER VALK 1981).

SUMMARY

The effects of draining and spring burning on the nutrient status of Typha glauca floating mats in a water-level stabilized freshwater marsh were examined in Eastern Canada (New Brunswick) and compared to the impact of fertilizer applications.
Treatment effects were evaluated in terms of phenological and growth characteristics of Typha glauca, using Typha as a phytometer. The parameters measured were (1) shoot emergence, (2) final shoot density, (3) final shoot height, (4) basal shoot circumference, (5) number of leaves per shoot, (6) duration of the assimilation period, (7) senescence, (8) susceptibility to drought, (9) damage by stem-boring insect larvae, (10) shoot standing crop and (11) litter load.

Draining lowered the water table to about 30 cm below soil surface and reduced Typha shoot standing crop to 64% of that in the undrained treatments. Reduced growth is assumed to be caused primarily by lower mean temperatures in the rooting zone of Typha rather than by lack of water or poor availability of nutrients; low substrate temperatures reduce the rate of nutrient uptake. During extended drought periods, however, water can become temporarily limiting under drained conditions, and then particularly in burned and/or fertilized treatments.

Burning in spring affected most of the growth parameters measured but did not significantly change Typha shoot standing crop; the nutrients released and made available to plants through combustion of surface litter were insufficient in quantity to stimulate Typha growth.

Nitrogen was the primary growth limiting factor. Addition of 200 kg/ha actual nitrogen resulted in a significant 1.86-fold increase in Typha shoot standing crop.

Phosphorus was not ordinarily limiting but became limiting when nitrogen was supplemented. When no nitrogen was added, application of 200 kg/ha actual phosphorus resulted only in a 1.24-fold increase (not significant) in Typha shoot standing crop. Addition of the same amount of phosphorus in combination with nitrogen (200 kg/ha) and lime 625 kg/ha), on the other hand, resulted in a significant 2.31-fold increase in shoot standing crop.

Liming at a rate of 625 kg/ha did not significantly affect Typha shoot production.

It is concluded that neither draining nor burning improved the supply of limiting nutrients sufficiently to stimulate Typha growth. Typha shoot production was primarily limited by nitrogen and secondarily only by phosphorus, which became limiting when nitrogen was supplemented.