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AN ABSTRACT OF THE THESIS OF

Judy Kaye Schnell for the Master of Science Degree
in Biology presented on October 3, 1990

Title: Seed Ecology of Illinois Bundleflower

Desmanthus illinoensis

Abstract approved: _____

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Seed ecology of Illinois bundleflower (Desmanthus illinoensis) was studied by looking at several aspects of ecology. Germination at varying temperatures with six different scarifying techniques was assessed. Scarification, which included mechanical and chemical, was observed at 10C, 13C, 17C, and 24C. Germination rates varied from 2% to 99%, depending on treatment. Germination increased with all scarification treatments and suggests that germination is inhibited by an extremely hard seed coat.

Heat treatments simulating fire were applied for eight seconds and thirty seconds at temperatures ranging from 100C to 500C at 50C intervals. Germination percentage of all heat-treated seeds was greater than the control. This indicates that Illinois bundleflower could be considered a fire species.

The effect of moisture stress on Illinois bundleflower seed germination was determined using mannitol as the osmoticum. Mannitol solutions varying from -0.033 MPa to

-2.5 MPa were used to germinate Illinois bundleflower seeds after a 10 minute scarification in concentrated sulfuric acid. Illinois bundleflower seeds germinated at water potentials as low as -1.0 MPa. This suggests that Illinois bundleflower seeds can germinate at relatively low soil water potentials.

Xylem pressure potentials of Illinois bundleflower seedlings were measured to determine lethal water potentials reached before death. Scarified seeds (10 minutes in concentrated sulfuric acid) were germinated, then planted 50 to a pot and placed in the greenhouse. Plants were watered every other day until they were 6" high. Two pots were kept as watered controls and water was withheld from all other plants. Xylem pressure potentials of the plants were checked with a pressure chamber. After obtaining xylem pressure potentials, the plants were watered and observed to see if plants recovered or died. Illinois bundleflower seedlings withstood 15 days of drought conditions and a xylem pressure potential of -3.5 MPa. Any xylem pressure potential below -3.5 MPa resulted in death for the seedlings.

The possibility for ley farming techniques was applied using Illinois bundleflower in an established wheat field. Plots were established and seeded at a rate of 10 lbs/a, or 171 seeds in a 9 ft² plot. Seeds were scarified in concentrated sulfuric acid for 10 minutes before planting.

Rows of Illinois bundleflower were planted between wheat rows and the plots were checked periodically for establishment. Plants were counted by row and plot. Biomass will be checked after this year's wheat harvest (i.e. year 2).

SEED ECOLOGY OF
ILLINOIS BUNDLEFLOWER
(Desmanthus illinoensis)

A Research Thesis
Submitted to
The Division of Biological Sciences
Emporia State University

In Partial Fulfillment
of the Requirements for the Degree
Master of Science

by
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October 4, 1990

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ACKNOWLEDGEMENT

Many thanks are extended to the faculty at Emporia State University who have given me moral support throughout my thesis work. Extra special thanks are given to Drs. Tom Eddy and Richard Schrock for their help and for serving as committee members during my thesis work. Special thanks also belong to Dr. David Edds for his encouragement and his willingness to help when Dr. Mayo was not available. His dedication and new ideas have been of great help. Thanks also to Dr. Rod Sobieski for his help and support. His work with the graduate students should be commended.

Special thanks belong to Dr. James Mayo. His outstanding knowledge in his field of biology (ecophysiology) and his willingness to convey his knowledge to his students have made me realize the importance of plants and soils in our society today. His understanding and support have been unending. He has not only been an excellent instructor, but a good friend as well. Without his support and ideas, this thesis would not have been successful.

Special thanks to my children, Amber and Thorin Schnell, for their support and endurance of the many hours spent at work on this thesis. Also many special thanks to Warren Voorhees for his help with the field work and his moral support and love to my children and me. He has made my work much easier and more meaningful.

Special thanks also belong to my dear friends, Bob Prather, Tanya Tims, Greg Taylor, Craig Romery, and Mark LaBarge. Without their support and their "two cents", my college career would not have been the same.

Thanks also belong to my father, W.R. Moore and my sister, Dorothy Hollabaugh. Without their moral support and of course my dad's financial backing, I never would have been able to finish.

Many thanks belong to Dr. Richard Keeling for his cartoon drawing in the back of this thesis and to Gary Anstey for his pencil drawing in the front of this thesis.

Special thanks also to Thea Anstey for her assistance in the greenhouse, and her moral support throughout this entire research effort.

INTRODUCTION

Illinois bundleflower (Desmanthus illinoensis) is a warm season, perennial herbaceous legume (Fig. 1). Illinois bundleflower, according to Jones and Luchsinger (1986), belong in the Order Fabales; Family Mimosaceae. However, Radford, Dickison, Massey, and Bell (1974) place Illinois bundleflower in the Order Rosales; Family Leguminosae (segregate order Fabales). The genus was derived from the Greek words (desme) "bundle" and (anthos) "flower" - because the inflorescence is a head composed of many small flowers. The name illinoensis was derived from (ensis) "from" and by the specimens of Michaux, a french botanist, who established the species in the Illinois territory in 1803 (Stevens, 1943). It is a prolific seed producer which produces seed heads in late June-August. The immature fruits occur in loose pods, which contort, mature and form a bundle (Fig. 2). According to The Flora of the Great Plains, Illinois bundleflower can be found readily on rocky, open wooded slopes, prairies, ravines, stream banks, roadsides or waste places (McGregor et al, 1986). McGregor et al (1977) and Gates (1940) have noted that Illinois bundleflower occurs extensively throughout the state of Kansas, whereas Weaver and Fitzpatrick (1980) make no mention of Illinois bundleflower in their monograph on the Kansas prairie.

Illinois bundleflower is listed as a plant normally found in climax prairie communities. Illinois bundleflower

Figure 1. Photograph of Desmanthus illinoensis.

Figure 2. Seed pods of Illinois bundleflower.

