

ABSTRACT

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Biology and Control of *Bromus pectinatus* Thunb.
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Investigations into the biology and control of the annual grassy weed *Bromus pectinatus* Thunb. were conducted at the National Plant Breeding Station, Njoro, Kenya, from 1982 to 1984.

B. pectinatus is described and, in the tradition of other *Bromus* sp. of similar morphology, the common name Kenya Chess is proposed for *B. pectinatus*.

Pot growth of *B. pectinatus* was influenced by soil type and microclimate, but not by seed origin. *B. pectinatus* was germinated and grown in amended and untreated soils ranging in pH from 3.05 to 8.13. Soils with a pH near 3 could not support growth or germination of *B. pectinatus*. *B. pectinatus* grew best on a soil of pH 6.55 and when soil pH influenced germination the optimum soil pH was 6.0. Out-of-doors grown *B. pectinatus* matured earlier and had fewer culms than plants grown in the shadehouse or glasshouse.

Exposure to light during germination, inhibited the germination of *B. pectinatus* seeds. Germination of *B. pectinatus* seed was most rapid at a 17 C temperature. Prechilling or preheating seeds did not promote germination of dormant *B. pectinatus* seeds. Germination of dormant *B. pectinatus* seeds was enhanced by seed hull removal or pricking the lemma or removing the rachilla segment.

Germination of *B. pectinatus* seed in the soil was unaffected by depth of burial, whereas, emergence was reduced to 35, 19, 11, 4 and 0% from depths of 0, 1, 2, 4 and 8 cm, respectively.

There was a relationship between field emergence of *B. pectinatus* and the precipitation pattern. After-harvest germination of *B. pectinatus* seed indicated that there was an innate dormancy in hulled seed which persisted for 8 months. The innate dormancy was mainly induced by the seed hull, but was also induced within the caryopsis itself.

Field measurements were used to develop an equation which related yield loss in wheat with *B. pectinatus* infestation. Delayed sowing of wheat and barley into a *B. pectinatus* infested site resulted in yield reductions that were correlated with length of delay.

Replacement series studies were conducted using varying proportions of wheat : *B. pectinatus* and rapeseed : *B. pectinatus*. Varying the proportions resulted in growth changes in the plants. *B. pectinatus* maturation was delayed when grown in a mixture. Rapeseed was unaffected by *B. pectinatus* interference.

A spatial interference study determined that *B. pectinatus* interferes with wheat mainly above ground.

The herbicides isoproturon, pendimethalin and oxadiazon were found to be ineffective against *B. pectinatus*. The herbicides triallate, chlorsulfuron, metribuzin, trifluralin and EPTC achieved limited control of *B. pectinatus*. Superior control of *B. pectinatus* was achieved using fluazifop-butyl at 0.25 kg/ha and fenthia-prop-ethyl at 0.12 kg/ha, in rapeseed.

FOREWORD

This thesis has been written in manuscript style. Chapters 1 to 6 will be submitted for publication in the East African Journal of Agriculture and Forestry.

INTRODUCTION

Bromus pectinatus Thunb. has recently been indentified as a serious weed problem of wheat and barley grown in the highlands of Kenya. A native plant of East Africa, *B. pectinatus* exists in nature as an annual ruderal, and was not known to be especially troublesome in crops. However, with successful control of wild oats (*Avena fatua*) and ryegrass (*Lolium sp.*) in cereals, a niche was opened which *B. pectinatus* was well suited to fill. *B. pectinatus* quickly spread from the headlands into this cereal field niche. The main reason for its spread was that *B. pectinatus* is extremely difficult to control with herbicides in cereals.

B. pectinatus seed germination is strongly influenced by dormancy and environment. Although a high proportion of the seeds germinate with the long rains, a significant proportion can continue to germinate throughout the cropping season. *B. pectinatus* competes early in the crop season and reduces yield, but is generally ripe and desiccated at harvest time and, therefore, does not interfere with harvest. Under good conditions *B. pectinatus* can produce 6,000 seeds per plant whereas one spikelet per plant will be produced when plants are so severely stunted by stress that they are only 10 cm high.

At present, *B. pectinatus* is a problem weed which cannot be consistantly controlled with existing herbicides in wheat or barley and is therefore a threat to continuous cereal production in Kenya. There is growing concern over the serious extent of infestation on some farms, and over the ever broadening distribution of the weed.

Research was initiated at the National Plant Breeding Station, Njoro, Kenya in 1982. The three objectives of this research were:

1.) to determine the distribution and importance of *B. pectinatus* as a weed; 2.) to conduct herbicide trials to develop immediately applicable control recommendations for farmers; and, 3.) to study the biology of *B. pectinatus* to enable development of a long-term integrated approach to *B. pectinatus* control in Kenya.