

MODE OF ACTION OF MBOA ON INHIBITION OF PLANT GERMINATION

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INTRODUCTION

It is well known that 6-methoxy-2-benzoxazolinone (MBOA) and its related compounds inhibit the germination and growth of several plant species. However, the physiological mechanism of MBOA on the inhibition is not fully understood. We found possible mechanical action of MBOA on inhibition of plant germination.

MATERIALS AND METHODS

MBOA was dissolved in a small volume of MeOH, added to a sheet of filter paper in a 9-cm Petri dish and dried. Then, the filter paper in the Petri dishes was moistened with 4 ml of a 0.05% (v/v) aqueous solution of Tween 20, and 50 seeds of cress (*Lepidium sativum* L.) were arranged on the filter paper and germinated in the darkness at 25 °C.

Germinated cress seeds were homogenized with an ice-cold solution Hepes-KOH (100mM, pH 7.5), 1 mM EDTA, 5 mM MgCl₂, 5 mM DTT, 10 mM NaHSO₃). The homogenate was centrifuged at 30,000 g for 20 min and the supernatant was used for α -amylase assay. The activity of α -amylase was assayed by measuring the rate of generation of reducing sugars from starch.

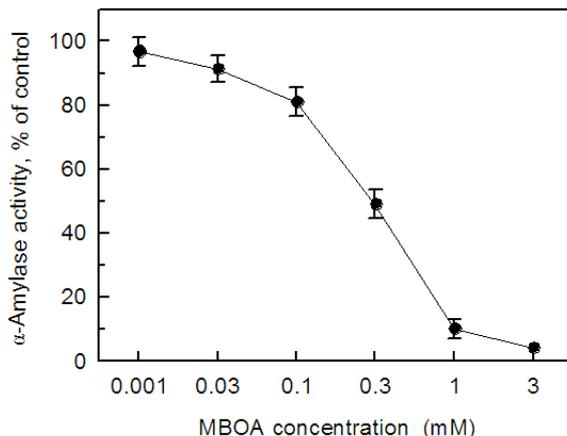


Figure 1. Effect of MBOA on α -amylase activity in cress seeds. Cress seeds were incubated in the solutions of MBOA for 36 h.

RESULTS AND DISCUSSION

MBOA inhibited the germination of cress seeds and the activity of α -amylase in the seeds at concentration greater than 0.1 mM (Figure 1). The inhibition was increased with increasing concentrations of MBOA.

Plant seeds for the germination accelerate respiratory metabolism to produce metabolic energy and biosynthetic precursors. Thus, readily respiratory carbohydrates, soluble sugars, must be

supplied constantly to maintain respiratory metabolism. However, the amount of soluble sugars in plant seeds is usually very limited, with starch being the main reserve carbohydrate (Ricard et al. 1998, Saglio et al. 1999).

α -Amylase plays a major role during the degradation of reserve carbohydrate to soluble sugars in starch seeds (Sun and Henson, 1991). Thus, induction of α -amylase is essential to maintain active respiratory metabolism and to allow to germination of the plant seeds.

MBOA inhibited the germination and the induction of α -amylase (Figure 1). These results suggest that MBOA may inhibit the germination of cress seeds by inhibiting the induction of α -amylase activity. It may be one of the possible mechanical actions of MBOA on inhibition of plant germination.

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