Potential of the lectin/inhibitor CrataBL for controlling *C. maculatus* larvae development

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Introduction and objectives: Bruchid beetle *Callosobruchus maculatus* is an important insect predator of cowpeas, attacking the seeds during storage and thus affecting the quality and yield of the harvest. Due to low seed germination, the post-harvest seed losses caused by *C. maculatus* can reach up to 100% over a period of 6 months, thus new methods for its control are needed. This study is aimed at an investigation of the effects of CrataBL, a protein that is both a lectin and a proteinase inhibitor isolated from *Crataeva tapia* bark, on *C. maculatus* larvae development. Materials and methods: Artificial seeds were prepared using the *V. unguiculata* seeds and FITC was covalently coupled to CrataBL for bioassay. Results and conclusions: The protein which is stable even in extreme pH conditions showed toxic activity in artificial seeds against *C. maculatus*, reducing the larval mass 45% and 70% at concentrations of 0.25% and 1.0% (w/w), respectively. Acting as inhibitor, CrataBL decreased by 36% the activity of cysteine proteinases present in the larval gut. Conversely, the activity of serine proteinases was increased about 8-fold compared to the control group. The toxic properties of CrataBL may also be attributed to its capacity of binding to glycoproteins or glycosaminoglycans. Such binding interferes with larval metabolism since, once conjugated to FITC, CrataBL was found in the fat body, Malpighian tubules, and in the feces of larvae. These results demonstrate the potential of this protein for controlling *C. maculatus* larvae development.

Keyword: bioinsecticide; *C. maculatus*; Lectin