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EFFECT OF THE INFECTION OF *CALLOSOBRUCHUS MACULATUS* (FAB.) ON THE PROXIMATE COMPOSITION OF LEGUMES GRAIN

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Abstract

Market survey was conducted to estimates of weight loss and proximate content (protein, oil carbohydrate and ash) caused by individual *Callosobruchus maculatus*. 200g legumes grains samples were purchased from Nasiriyah city. Weight lossand proximate content were investigated. The proximate contents were evaluated for legumes seeds using the protein, oil, carbohydrate and ash. Significant differences were found between uninfected and infected grains of legumes in weight loss and proximate content. The weight loss and proximate content of the infected grains decreased significantly (P< 0.05) compared with uninfected seed. The results showed the storage of grains in unsuitable conditions lead to damage the legumes grains and their proximate content by *Callosobruchus maculatus*

Keywords: *Callosobruchus maculatus;* Proximate Composition; Legumes grains

Introduction

The study of *Callosobruchus maculates* is important to preserve stored food approximately half of what is lost from food causes insect pests. Among the insects that infect the legume family plants is *Callosobruchus maculates* that belong to Bruch idea family (Gouhar *et al*., 1984). The *Callosobruchus maculatus* insect is multi voitine and widespread in tropical and subtropical regions. Leguminous crops are a major source of food in many developing countries. The percentage of cultivated areas in the Arab countries is about 5.5-8% of the total cultivated area for its nutritional value of protein, oil, carbohydrates, vitamins and essential and elements for humans (Meiners *et al*., 1976). This is considered one of the cheapest and richest sources of dietary protein, which is used as an alternative or supplement in a relatively expensive animal protein in a human diet. In addition to proteins, carbohydrates, minerals and vitamins are also present in legumes (Salukhe, 1982). Protein content of pulses varies from 17 to 34 per cent, including metabolic, structural and storage proteins. Protein storage is made up of 80% of the total protein (Sgarbieri and Whitaker, 1982). This research was assumed to investigate the legumes grains and their proximate content weight loss caused by individual *C. maculatus* in legumes grains

Materials and Methods

Market survey was conducted to estimates of weight loss and proximate content (protein, oil carbohydrate and ash) caused by individual *Callosobruchus maculatus*. Exactly 5 g each of the grains of all plants were weighed and oven dried to a steady temperature of 60°C. Samples were individually analyzed for proximate content using the official standard methods. Protein content was assessed from the crude nitrogen content of the sample estimated by the Micro Kjeldhal method (N × 6.25) (AOAC, 1975). Fat content of the samples was determined by Soxhlet method given by (AOAC, 1975). Carbohydrate was calculated by difference method. Ash content of the samples was determined by the procedure given by Association of Official Analytical Chemists (AOAC, 1975). The amount of carbohydrate in each of the sample was then estimated as the difference from 100 of the sum of crude protein, fat and ash.

Statistical Analysis

Statistical comparisons of the results were performed by one-way ANOVA using SPSS ver.19. Significant differences (P<0.05) among the grains of legumes were analyzed by Duncan 'triplicates range test (Bryman and Cramer, 2012).

Results and Discussion

Among the legumes grain studied the *Vigna unguiculata* was highest in the weight loss for the infected grains (Fig. 1) and the lowest weight loss was in *Vicia faba grain.* No significant different between *Pisum sativum* and *Lens esculenta.* Our results agree with (Ebana *et al*., 2017) showed that not all kinds of grains with the same infection.

Proximate analyses (percentage, protein, oil, carbohydrate, ash) were carried out on legumes grains and the result is shown in Fig 2, 3, 4, 5. Protein content of legumes grains were ranged from 38.08 to 19.10 % in

infected and uninfected of legumes grains. High protein content was observed in infected grains in all legumes grains. Oil content of uninfected of legumes grains was higher than infected of legumes grains. High oil content (17.60%): *Vinga radiate* and *Cicer arietinum* 4.50%, respectively. Among the grains in this study, *Lens esculenta* showed the lowest oil value (1.19%) for infected grains. Figure 4 shows Carbohydrate content for six different grains of legumes. The results showed that carbohydrate content of legumes grains uninfected was significantly. *Pisum sativum* and *Lens esculenta* having significantly (P< 0.05) compared to other legumes grains. The result ranged from 73.7 to 24.50% in *Pisum sativum* and *Vinga radiate* respectively. Also between the same species at different infection showed higher Carbohydrate content for uninfected grains compare to infected grains in all legumes. The following order was observed: *Pisum sativum* > *Lens esculenta* > *Cicer arietinum* > *Vigna unguiculata* > *Vicia faba* > *Vinga radiate.* The effects of *Callosobruchus maculatus*. in ash contentis shown in Figure 5. Significant differences (p>0.05) in ash content in infected and uninfected grains of legumes. *Pisum sativum* was found among the different grains gave the highest ash content 5.43% uninfected grains when compared with other infected grains. Ash content in *Pisum sativum* grains in both Infected and uninfected was higher than other legumes grains. These results indicated that *Callosobruchus maculatus* had effect on weight loss, protein, oil, carbohydrate and ash content due to the fact that proximate content of legumes grains can be influenced by *Callosobruchus maculatus*, cultivar and storage period. Our finding of protein, oil, carbohydrate and ash content were more similar to the proximate analysis (Oiimelukwe and Ogwumike, 1998; Nayan *et al*., 2017; Ahmaed *et al*., 2003; Bamaiyai *et al*., 2007).

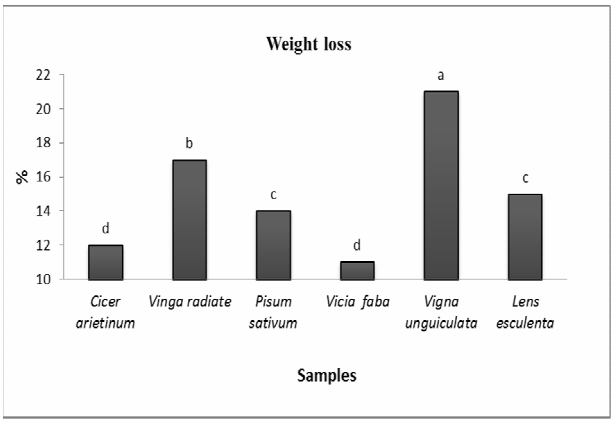

Fig. 1: Percentage of weight loss of infected legumes by *Callosobruchus maculatus* [a-d]Mean with different letters are significantly different (P < 0.05).

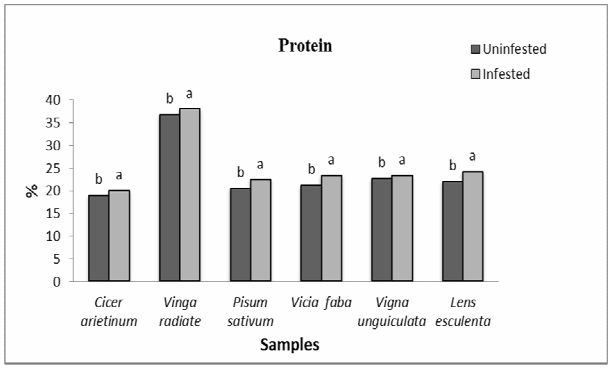

Fig. 2 : Effect of *Callosobruchus maculatus* on the protein of legumes grains [a-b]Mean with different letters are significantly different (P < 0.05).

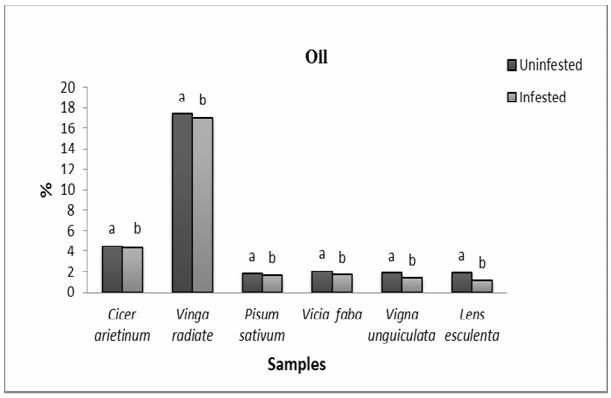

Fig. 3: Effect of *Callosobruchus maculatus* on the oil of legumes grains [a-b]Mean with different letters are significantly different (P < 0.05).

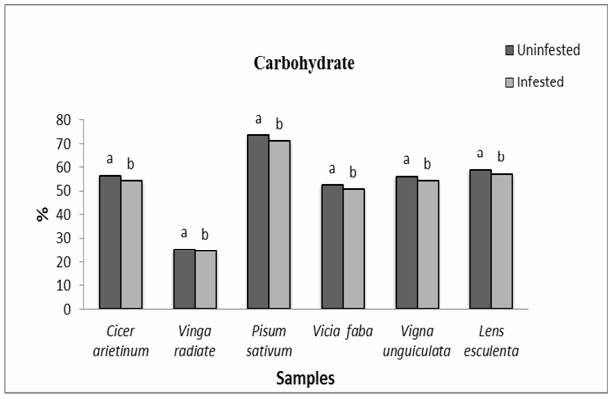

Fig. 3 : Effect of *Callosobruchus maculatus* on the carbohydrate of legumes grains [a-b]Mean with different letters are significantly different (P < 0.05).

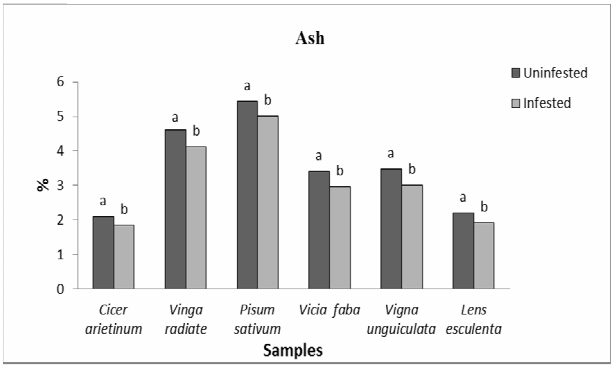

Fig. 5 : Effect of *Callosobruchus maculatus* on the ash of legumes grains [a-b]Mean with different letters are significantly different (P < 0.05).

Conclusion

The results of this study have reliable evaluations of legumes grains weight loss and proximate content caused by individual *C. maculatus.* This is an important element to provide adequate storage conditions to prevent infection by *C. maculates* and maintain nutritional value.

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