BIOLOGICAL ACTIVITY OF SOME COMPONENTS EXTRACTED FROM RED ALGAE

By

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CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABREVIATIONS

ABA	: Abscisic acid
DAS	: Days after sowing
DNSA	: Dinitrosalycylic acid
DSI	: Disease severity index
DW	: Dry weight
ELISA	: Enzyme-Linked Immune Sorbent Assay
FAA	: Free amino acid
FW	: Fresh weight
G-POD	: Guaiacol peroxidase
HMW	: High molecular weight
IAA	: Indol acetic acid
ISR	: Induced systemic acquired resistant
LMW	: Low molecular weight
PAL	: Phenylalanine ammonia lyase
POD	: Peroxidase
PPO	: Polyphenol oxidase
PR-proteins	: Pathogeneses-related proteins
PVP	: Polyvinylpyrrolidone
PVY	: Potato virus Y
RE	: Red algae Extract
ROS	: Reactive oxygen species
SDS-PAGE	: Discontinuous polyacrylamide gel electrophoresis
SLE	: Seaweed Liquid Extract

ABSTRACT

Walaa Abd El-Nasser Abd El-Kader El-Shalakany: Biological Activity of some Components Extracted from Red Algae. Unpublished Ph.D. Thesis, Department of Agricultural Biochemistry, Faculty of Agriculture, Ain Shams University, 2015.

The present study was conducted in the Faculty of agriculture green house or farm; Ain shams University at Shoubra El-Kheima, Kalubia Governorate during the two successive seasons of 2012 and 2013. Potato tubers (*Solanum tuberosum*, Diamond) were grown in dark plastic bags. The potato seedlings inoculated with PVY, and treated with red algal aqueous extract (10, 20, 30%) and carrageenanes (1mg/ml), which were applied at three times. Wheat grains (*Triticum aestivum* L.) var., Sakha 93, was germinated in the field experience. The growing wheat plants were foliar sprayed twice (at flowering and grain development stages) by each of three concentrations of (10, 20 and 30 %) of *Chondrus crispus* extract under recommended fertilization by ministry of agriculture.

Results obtained from potato experiment showed that the disease severity and PVY concentration were reduced in the treated plant. Potato virus Y caused a significant increase in the levels of proline, total phenolic compounds, phenylalanine ammonia lyase (PAL) activity, antioxidant defense enzymes (peroxidase and polyphenol oxidase) of potato leaves and amylase activity of resultant tubers, while, it led to a significant decrease in starch concentration by about 35% than control plants. On the other hand, the foliar spraying both algal extract and carrageenan were improved of infected plant growth related to significantly increased in proline, total phenols, PAL, peroxidase, polyphenol oxidase, amylase activity and starch concentration either in pre or post PVY inoculation. The enhancement of plant growth was found

associated with restriction of virus concentration as proved by ELISA. The results indicated that the use of carrageenanes (1mg/ml) and highest concentrations of red algal extract (20 % and 30 %) induce systemic resistance provide an efficient tool, as antiviral agent to manage potato virus Y in potato plants.

Results obtained from wheat experiment showed that foliar spraying with 20% algal extract reached the productivity of wheat by 62% than control; increased the yield attributing characters (flag leaf area, height and weight plant, length and weight spike, grain number/spike, weight and size of 1000 grain and specific test weigh), the nutritive quality of grains (starch, total carbohydrates, macro and micro nutrient elements, protein content of grains which is reflected on improving the rheological properties of dough. In contrast, the highest concentration of algal extract (30%) reduced the productivity by 38%, the nutritive quality of grains and wheat straw. Also, foliar spraying with algal extract (at 20%) to wheat plants showed positive effects on protein fractions, hence consumption of these whole grains may render beneficial health effects. It is worthy to mention that, the new band no. 1 with high molecular weight (HMW= 135 KDa) subunit protein was induced in grains of plants in response to algal application. Finally, the nutritive quality of wheat straw such as ash, total carbohydrates and crude protein percentages were increased as a result of foliar spraying with 20% of algal extract.

Keywords: Red algae, Carrageenanes, PVY, Potato, Wheat and Yield.