IMPROVEMENT OF SNAP BEAN (*Phaseolus vulgaris* L.) TOLERANCE TO SOIL SALINITY USING GAMMA IRRADIATION, HUMIC ACID AND SODIUM NITRO PRUSSIDE

BY

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APPROVAL SHEET

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Title of Thesis: Improvement of Snap bean (*Phaseolus vulgaris* L.)Tolerance to Soil Salinity Using Gamma Irradiation, Humic acid and Sodium nitroprussid.
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ABSTRACT

This experiment was comied out in the experimental forum of the National Center for Radiation Research and Technology –Naser city. Cairo- Egypt, during the two successive seasons of 2015/2016.Plants were sown in plastic pots(23cm of diameter). Seeds of snap bean cv.poulista were irradiated with 0,20 and 40 Gy of gamma irradiation from Cesium 137 at the dose rate of 28.5 Gy/h and 27.9 Gy/ h in both seasons respectively. While plants were sprayed with 0,4 and 8/Lof humic acid ,0,03 and 0.06g/l of sodium nitro preside under (non saline soil,500, 1000 and 2000 ppm).The mixter of soil salinity was composed from sodium chloride, calcium chloride and magnesium sulfate at the rate of 2:2:1.The foliar application was comied out at the age of 21 days after planting and was replicated every week for 5 times. It was found that soil salinity specially 1000 and 2000ppm decrease plant height, leaf number and an increase in Total sugars and total phenols. Whil both non saline conditions (control) followed by 500ppmof soil salinity scered the highest concentration of chlorophyll, pod length, podnumber per plant, potasseim, calcium and magnesium percentage in shoots. As for podcharacters, plants grown under non saline conditions and 500 ppm of soil salinity gave the highest pod number per plant, pod fresh and dry weight and total yield. The foliar application with 4g/lof humic acid generally increased most of vegetative and chemical characters, 20 Gy of gamma irradiation significantly increase pod number per plant, pod fresh and dry weight. Theinteraction between different soil salinity levels and different treatements show that spraying plants grown under non saline conditions with 4g/l of humic acid scored the tallest plant, hvighest number of leaves,number of branches, leaf area, whole plant fresh and dry weight, pod number per plant and pod diameter. The interaction between 20 Gy of gamma irradiation and non saline conditions led to an increase in chlorophyll a, b, total chlorophyll and carotenoids. Both gamma irradiation with 20 Gy or foliar application with 4g/l of humic acid with 500 ppm of soil salinity significantly increases leaf number, root length, leaf area, root, stem and leaf fresh and dry weight and pod number per plant.
Key words: *phaseolus vulgaris*, salinity, gamma irradiation, humic acid, sodium nitro prusside, parameters, photosynthetic pigments, total sugars, total soluble phenols, protein, proline, minerals.

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LIST OF ABBREVIATIONS

Abbreviation	Meaning of abbreviation
%	Percent
$^{-1}$	Per
/	Or and per
ABA	bscisic acid
ATPase	Adenosine triphosphatase
ºC	Degree celcius
CAT	Catalase
Chl	Chlorophyll
Cm	Centimeter
cm^{-1}	Per centimeter
cm^2	Square centimeter
Cs 137	Caesium-137
CV	Coefficient of Variation
Cv.	Cultivar
DAP	Day after planting
dSm^{-1}	Deci Siemen per meter
EC	Electrical conductivity
EDTA	Ethylene Diamine Tetra Acetic acid
EM	Effective Microorganisms
et al.	Co workers or and others
FAO	Food and Agricultural Organization of the United Nations
Fv/Fm	Maximal quantum yield of PSII photochemistry
GA_3	Gibberellin
g	Gram
g^{-1}	Per gram
Gy	Gray = 100 rad
Ha	Humic acid
He	Hectare
HPLC	High performance liquid chromatography
H_2O_2	hydrogen peroxide
I	Liter
IAA	Indole acetic acid
i.e.	That is
kDa	Kilodalton
kg	Kilogram
Kr	Kilo rad = 1000 rad
L.	Linnaeus
L-NNA	Nitro-L-arginine

LOX	Lipoxygenase
LSD	Least significant difference
mg	Milli gram
mg^{-1}	Per milli gram
$MgCl_2$	Magnesium chloride
min	Minutes
ml	Milliliter
mM	Millimolar
mM^{-1}	Per millimolar
NBT	Nitro blue tetrazolium
NCRRT	National Center for Radiation Research and Technology
nm	Nanometer
No.	Number
NO	Nitric oxide
NOS	Nitric oxide synthase
O.M	Organic matter
$ONOO^-$	Peroxynitrite
pH	Potential of Hydrogen
POX	Peroxidase
ppm	Part per million
PPO	Polyphenol oxidase
PSII	Photosystem II
PVP	Poly vinyl pyrrolidone
r	Rad
ROS	Reactive Oxygen Species
rpm	rouds per minute
SNP	Sodium nitroprusside
SOD	Superoxide dismutase
T-DNA	Transfer DNA
µl	Micro liter
µM	Micromle
UV	Ultra violet
W	Watt (flourscent lamp)
w/v	Weight (of solute) per volume (of solvent)
γ-rays	Gamma rays

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