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EFFECT OF ADDING FISH SCALES IN AGRICULTURAL SOILS AND SOME CHARACTERISTICS OF *VIGNA RADIATA* L.

Basim Y. Alkhafaji* and Roaa Jafar Elkheralla
Department of Biology, College of Science, Uiversity ofThi-Qar, Iraq.
***E-mail**: basim_y_d@yahoo.com

Abstract

An experiment was conducted in pots at botanical garden of the Department of biology, College of Science, University of Thi-Qar during September until November 2018. The experiment aimed to study recycled fish scales as organic fertilizer and its effect in some of the chemical and physical properties of soil, As well as its effect in some morphological(height of plant, leaf length, leaf area, grains number and total dry weight for shoot and root system) and chemical characteristics(chlorophyll content) of *Vigna radiata* L. The experiment contained the following treatments: control (0%) 0 gm fish scales/30 kg soil, (1%) 300 gm fish scales/ 30 kg soil, (2%) 600 gm fish scales/30 kg soil and (3%) 900 gm fish scales / 30 kg soil. All fish scales treatments showed significant increase in all morphological and chemicals characters compared with the control. (3%) treatment gave significant increase as compared to other treatments in all morphological characters (height of plant, leafs length, leaf area, grains number and total dry weight for shoot and root system). It gave increases by 26.3 cm, 9 cm, 80.1cm^2, 18, 8.81 gm and 4.25gm respectively compared with the control. The T3 treatment also gave significant values in chlorophyll content (22.72µg/gm) as compared to other treatments and the control treatment .

Keywords: Fish scales, *Vigna radiata* L, agricultural soils.

Introduction

The skin of most fishes is covered with scales, which, in many cases, are animal reflectors or produce animal coloration. Scales had vary enormously in size, shape, structure, and extent, ranging from strong and rigid armour plates in fishes such as shrimp fishes and boxfishes, to microscopic or absent in fishes such as eels and anglerfishes. The morphology of a scale can be used to identify the species of fish from where it come.

Cartilaginous fishes (sharks and rays) are covered with placoid scales. Most bony fishes are covered with the cycloid scales of salmon and carp, or the ctenoid scales of perch, or the ganoid scales of sturgeons and gars. Some species are covered instead by scutes and others have no outer covering on the skin.

Fish scales are part of the fish's integumentary system, and are produced from the mesoderm layer of the dermis, which distinguishes them from reptile scales (Sharpe, 2001). The same genes involved in tooth and hair development in mammals are also involved in scale development. The placoid scales of cartilaginous fishes are also called dermal denticles and are structurally homologous with vertebrate teeth. It has been suggested that the scales of bony fishes are similar in structure to teeth, but they probably originate from different tissue (Perkins, 2013).

The research study aimed to know the morphological and chemical effect of fish scales as organic fertilizer upon the plant *V. radiata* and amendment of agriculture soil to the mentioned plant.

Materials & Methods

The mung bean (*Vigna radiata*), alternatively known as the green gram, maash, or moong was chosen from the Fabaceae group for planting in a pots, capacity is 30 kg soil per one pot. The experiment includes the following treatments: control (0%) 0 gm fish scales/30 kg soil, (1%) 300 gm fish scales/ 30 kg soil Which is equal to30 ton per hectare, (2%) 600 gm fish scales/30 kg soil (60 t/h) and (3%) 900 gm fish scales / 30 kg soil (90 t/h) .

Chemical and Physical Analysis of Fish Scales

Fish scales samples were collected from the Carp fish (*Carpinus carpio*) and placed in Nylon bags, the samples were dehydrated and tested and packaged in plastic containers. pH and E.C.(electrical conductivity) were determined according to (Demiralay, 1993; Di Martino *et al*., 2003). Fish scales organic matter (O.M.) was measured using the Smith-Weldon method as described in (Rhoades and Salinity, 1996) nitrogen and phosphorus in fish scales were determined according to (Nelson and Sommers, 1982).

Table 1 : The chemical composition of fish scales applied

Parameter	Fish scales
pH	7.8
E.C dS/m	4.2
O.M. (gm/kgm)	18%
Nitrogen	2.83%
Phosphorus	72.7(mg/100g)
Potassium	89.4(mg/100g)

Growth Measurements of Plant

At the end of the experiment; plant height, leaf area, plant dry weight ,grains number and total dry weight for root and shoot system were recorded.

The height and area of leaf were determined by using the following equation Calculation of Space and Science leaf Method **(Jackson, 1958)**:

Leaf area =leaf length * Maximum paper width *0.905

The plants were harvested and weighed the grains, plants were dehydrated and then puted in the oven at (68ºC) until constant weight and dry weight record for each treatment.

Determination of Chlorophyll Content

Chlorophyll content in leaves was determined by method (Senedcor and Cohran, 1982; Kemp, 1960). Plant leaves were taken (the second leaf) of each treatment and placed in special bags until reach to the laboratory, and then directly take 200 mg of each leaf and then grin the wet leaves using a ceramic mortar with 20 mL of acetone (80%) and separating the leachate from the remaining precipitate by centrifugation, absorption of solution was measured by using spectrophotometer with (663-645) nm, chlorophyll value was conducted according to the following equation :

Chl.a = [12.7 (D 663) - 2.69 (D 645)] ×V/(1000×W)

Chl.b = [22.9(D645) - 4.68 (D 663)] ×V/(1000×W)

D=optical density on (663 and 645) nm

V= The final size for aceton (80%)

W= Wet weight of plant tissue

Results & Discussion

Effect of fish scales on E.C., pH and Soil Content of Organic Matter After Harvesting :

All treatments of fish scales showed a significant decrease in the soil (pH) value, this due to the degradation of the organic substance in the soil and produce acids, while the addition of fish scales for all treatment resulted in a significant increase in the values of (E.C.) this due to the exist of the salts in the scales .

The value of pH in control was more than the value in all treatments, whereas the value of E.C. in the control was less than the value in all treatments, as shown in table (2).

The amount of organic matter in the soil after the harvest increased with the level of addition fish scales and reached this increase to 18 gm/kg in 3% compare with control.

Table 2 : The chemical analysis of soil

Fish scales	pH	E.C. dS/m	O.M. (gm/kgm)
0%	7.4	4.3	10
1%	7.3	4.5	12
2%	7.1	4.5	16
3%	7.0	4.7	18

Effect of the Addition Fish Scales upon the Morphological Charectares of *V. radiata*

The results (Table 3) showed effect of organic matter in fish scales on vegetative growth in *V. radiata*, significant increase in the growth indicators of plant height, length of leaf, area of leaf and number of grains.The resulte obtained that T. (3%) has been the best growth in all treatments, this due to the organic rules in improving quality of soil properties (Environment and Bioterrorism, 2008) also the content of the organic media include on many elements especially nitrogen, phosphorus and potassium these elements have an important role to play in their intervention Biological and phylogenetic processes of plants (AL-Jala, 1988; Abu Dahi and Al- younis, 1988).

Table 3 : Effect of fish scales on morphological propertise in maash

Fish scales	Steam length (cm)	Leaf length (cm)	Leaf area (cm^2)	Numbers of grain
0%	20.4	8.1	68.0	6
1%	24.1	8.6	76.4	8
2%	24.8	8.8	78.8	12
3%	26.3	9.0	80.1	18

The increase in the concentration of chlorophyll in leaf tissue treated with fish scales may return to contains many elements that are involved in the synthesis of chlorophyll such as Nitrogen, which helps to build chlorophyll (Matlube, 1988). The dry weight were also increased when treated with fish scales in all treatment especially in (3%) as shown in (Table 4). The increase in maash production and the improvement of growth indicators in the addition of fish scales may be due to improve physical and chemical properties of soil, resulting in an increase in nutrient facility and thus increase absorption and growth (Sahaf, 1989).

Table 4 : Effect of fish scales on dry weight (gm) and chlorophyll content (µg/gm) in maash

Fish scales	Chlorophyll content (µg/gm)	Dry weight of shoot system (gm)	Dry weight of root system (gm)
0%	18.62	7.14	3.12
1%	19.97	8.56	3.21
2%	20.24	8.72	4.01
3%	22.72	8.81	4.23

Conclusion

1. Organic waste (fish scales) can be converted to organic fertilizer.
2. Minimize the use of chemical fertilizers.
3. Improve the qualities of soil chemical and physical.
4. To improve the quantity and quality of plant production.

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