

Screening of Soil Nutrient Analysis and Pesticide Residues from Kodaikanal, Dindigul Districts of Tamil Nadu

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Abstract - The increasing use of chemical fertilizers and pesticides for agricultural production is causing soil pollution. The objective of this study was to investigate the soil nutrient analysis and pesticides residues in soil samples from Kodaikanal, where the fruit and vegetables are cultivated more. There has been an increasing concern about food quality and safety of agricultural products obtained from contaminated sites. The bioavailability of nutrients in the soil may bring to a close growth and productivity of crops. The soil samples were collected from different places of cultivated land particularly carrot field in Vilpatti, Pallangi, Mannavanur, Poomparai and Pazhamputhur were selected. Nitrogen content showed 84%, whereas Phosphorous 5.5% and Potassium 120%. NPK level as well as Zn, Fe, Mn, Cu nutrients were showed sufficient amount except nitrogen content. GC-MS was done for the analysis of pesticides residues in the cultivated soil. No pesticide residues were found in the cultivated soil. The nutrient analysis of Carrot (*Daucus carota*) were analyzed and the result showed that rich in protein, carbohydrate, fibre, ash and further FTIR analysis was performed to know the functional groups on vegetables.

Key words: Soil Nutrients, Pesticides, GC-MS, FT-IR, *Daucus carota*

1. INTRODUCTION

Soil nutrients are critical elements for plant growth and efficient productivity. Soil contains mixtures of minerals, organic matters which supports the plant growth they differs from the parent material in the morphological, physical, chemical and biological properties.(3) The bioavailability of nutrients in the soil solution may determine plant growth and existing nutrient grade of the plant (Hillebrand Hailu). Plant sustains large microbial population in rhizosphere by secreting substance like carbohydrate and aminoacids through root cells.

The most common form of N fertilizer is highly soluble in the soil solution and can be easily lost by leaching or by bacterial de nitrification. P is the second most essential factor in determining plant productivity because the anionic

form of phosphate, in which P is assimilated by plants, is extremely insoluble in the soil solution. This insolubility is due to the affinity of P to cations such as Ca²⁺, Mg²⁺ and Al³⁺, and its ready adaptation into organic forms that are not amenable to plant uptake(8). Micronutrients, such as Fe, those are required in small concentrations for plant growth can become very restrictive elements. (2).The present study is carried out by evaluating the soil fertility in eight places of kodaikanal and crops nutrient content.

2. MATERIALS AND METHODS

2.1 Collection of Soil samples:

Soils under carrot cultivation from four different sites (agricultural fields) of Dindigul district of Tamil Nadu random sampling method was adopted for soil collection. Soil was collected from 5-6 different sites of each agricultural field by digging soil to depth of 15-20 cm. The samples were brought to laboratory, dried at room temperature for 72 h and finally ground into fine powder. The soil nutrient analysis and Pesticide residues was analysed using GC-MS in Tamil Nadu Agriculture University, Coimbatore.

2.2 Phytochemical and FTIR analysis of Vegetables

The Fresh vegetables of carrot were collected from agriculture land of Kodaikanal and were powdered. Then 20g of powder was dissolved in 100ml of methanol and incubated in Shaker. Then the extract was filtrated with Whatman filter paper No.1, and then concentrated in vacuum 40°C using rotary evaporator and these extracts were subjected to the qualitative phytochemical and FTIR analysis.

3. RESULTS AND DISCUSSION

Soil acts as an important part of all terrestrial systems, providing habitat for micro-organisms, plants, and animals. The soil characteristics and the amount of macro and micronutrients values were presented in the Table1. Nitrogen content in soil was low compared to other

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Phosphorous and Potassium. Today, an increase in the consumption of nitrogen and phosphorus fertilizers has been observed globally.

In GCMS analysis for detection of pesticides residues, the major organo chlorines, organo phosphates and synthetic chemicals were screened namely DDT (Dichloro diphenyl trichloroethane), Ethylene, chloryrifos, Quinaphos, Profenofos, Ethion, Triazophos, Endosulfan, Bifenthrin, Cyhalothrin, cyfluthrin, Permethrin, Fluvalinate, Dieldrin, Phorate, Carbofurn and Fipronil. GCMS result confirmed that there were no pesticide residues were present in the collected agriculture soil. Nutrient analysis of *D. carota* was estimated and it showed that rich nutrient content were available. The tested values are more or less equivalent to the standard values. (Table2). Fourier transform infrared spectrophotometer (FTIR) is most frequently used for identification of organic and certain inorganic compounds present in complex biological samples. . FT IR analysis of *D. Carota* was showed the major functional was presented, such as amides, aldehydes, aliphatic ketone, aromatic aldehyde, azo compound, aromatic, alkynes compounds are present (Table3).

Table-1: Soil Nutrient analysis

Parameter	Mannavanur	Pazhampathur	Pallangi	Villpatti	Poompalai
Colour	Black	Black	Black	Black	Black
Texture	Alluvial soil with slit	Slit with sand	Alluvial	Alluvial	Alluvial
CaCo3	No	No	No	No	No
EC	0.45	0.07	0.14	0.14	0.08
pH	5.3	6.3	7.7	7.7	4.7
N	111	83	141	84	140
P	0.5	26	42	5.5	42
K	40	145	500	120	135
F	7.8	8.6	7.6	8.14	8
Ma	5.8	6.4	6	5.72	6.12
Zi	1.72	1.2	1.6	1.16	1.8
Co	2.26	3.24	2.1	2.8	2.06

Table-2: Nutrient analysis of *Daucus Carota*.

S.No	Parameters	<i>D. carota</i> (g/100gram)
1	Carbohydrates	0.769
2	Proteins	0.0784
3	Fiber	0.237
4	Ash	0.0698

Table-3: FTIR analysis of *Daucus Carota*.

Frequency	Wave Length	Shape	Compounds	Stretch
3579.47	3200-3600	strong, broad	Alcohol	(stretch, H-bonded)
3376.69	3200-3600	strong, broad	Alcohol	(stretch, H-bonded)
2832.88	2820-2850 & 2720-2750	medium, two peaks	Aldehyde	Stretch
2657.49	2500-3300	strong, very broad	Acid	Stretch
2080.36	2260-2100	Weak	Alkynes	C≡C
1633.52	1550-1640	Bending	Amide	
1447.80	1400-1600	medium-weak, multiple bands	Aromatics	stretch
1363.51	1515-1560 & 1345-1385	strong, two bands	Nitro	Stretch
1138.38	1000-1300	two bands or more	Ester	Stretch
1056.70	1000-1300	two bands or more	Ester	Stretch
995.58	1000		Esters	C-O

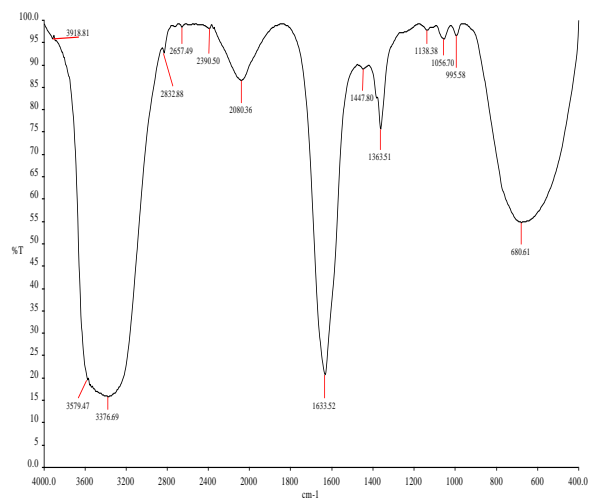


Fig-1: FTIR analysis of *Daucus Carota*

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CONCLUSION:

In the present study, the nutrient content of different soil samples collected from Kodaikanal was analyzed. It showed that soil nutrient were present sufficient amount for cultivation of crops except nitrogen content. There was no pesticide residuals were found in agricultural soil. Though, the soil can be enhanced through organic farming such as bio fertilizers and bio pesticides with already available resources with low cost in the market. Cultivated crop Carrot showed rich nutrient content.

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