

Effect of Lemon Waste on Soil pH and Availability of Micronutrient in Calcareous Soils of Fars Province, Southern Iran

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ABSTRACT

Most of soils of Iran are calcareous in nature. The orchard trees are widespread in south of Iran. Sour lemon is one product of the area and is processed for lemon juice. To evaluate the effect of lemon waste on soil pH and availability of micronutrients, composite soil samples were collected from 0-40 Cm of the area and analyzed for physico- chemical properties.

Lemon waste was gathered from processing factory, dried at 70°C and crushed to 1-2 mm size. A statistical complete randomized design with 4 replicate and 30 treatments were used for evaluation of lemon waste on soil properties. The treatments were 0, 100, 200, 400, 800, and 1600 PPM of lemon waste which were added to pots containing 160 go soils and leaved in incubator for 0, 2, 4, 8, and 16 weeks at 27-30°C, pot moisture were kept at field capacity during the experiment. At dates of 0, 2, 4, 8, and 16 weeks after treatment the treated soils were sampled and physico-chemical properties were determined.

According the results, the pH of treated soils with lemon waste decrease and organic mater increase slightly with increase in amount of lemon waste and time of incaution.

The availability of Cu, Zn, Mn, Fe, and P in treated soils increased with increasing the amount of lemon waste and time of incubation.

INTRODUCTION

Most of soils of Iran are calcareous in nature and show high pH and micronutrients deficiencies. Micronutrients (Fe, Mn, Zn and Cu) and phosphorous deficiency is a problem in calcareous soils. It has been shown that plant availability of Micronutrients is profoundly affected by soil reaction (4, 6, 9, 13). Availability of micronutrients tends to increase with increase in soil organic matter and decrease with increase in soil reaction and calcium carbonate (2). Bloomfield and Pruden (3) showed the effect of time of aerobic incubation on availability of some trace elements. The orchard trees are widespread in south of Fars province and cover more than 20000 ha. Sour lemon is one product of the area and is processed for lemon juice. The waste is considerable and its land fill is one of environmental problem.

Study Area

Jahrom(study area), 5882 Km² is located 194 km south-east of Shiraz, Fars province, southern Iran at altitude of 25° ,30' and latitude of 50° ,50' with mean height of 1078 m from sea level (figure 1). Mean annual precipitation (33 years) is 266.2 mm and highest and lowest mean annual temperature is 48°C and -8°C respectively.

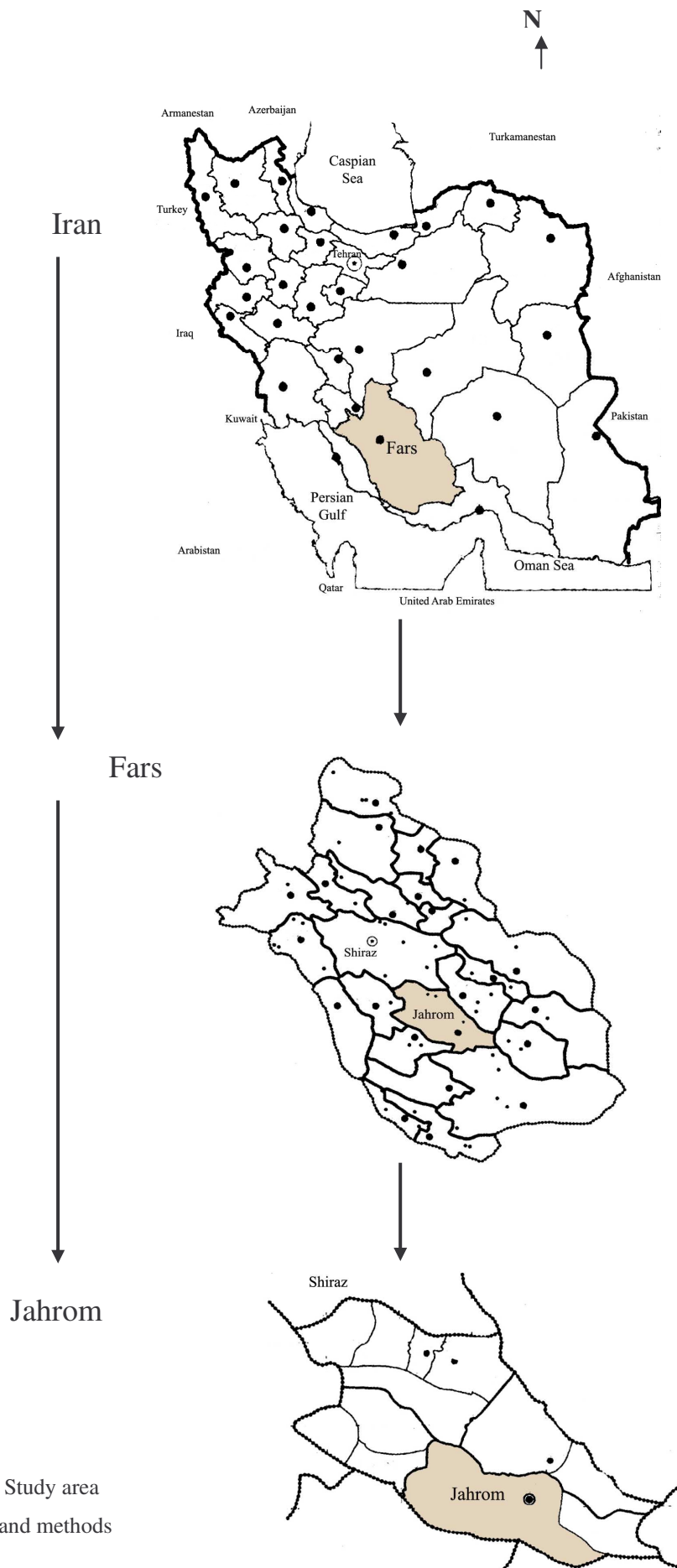


Figure 1: Study area
Material and methods

To evaluate the effect of lemon waste on soil pH and availability of micronutrients, composite soil samples were collected from 0-40 Cm of the area, air dried and passed from 2 mm sieve and analyzed for physico- chemical properties (table 1)

Table 1: physico-chemical properties of selected soils and Lemon waste

pH	CCE	OM	Texture	Zn	Cu	Fe	Mn	
	%			(PPM)				
7.87	66	0.6	silty clay loam	1.90	0.56	4.20	14.6	soil
4.80	-	86	-	0.22	0.18	0.80	0.60	Lemon waste

Lemon waste was gathered from processing factory, dried at 70°C and crushed to 1-2 mm size. A statistical complete randomized design with 4 replicate and 30 treatments were used for evaluation of lemon waste on soil properties. The treatments were 0, 100, 200, 400, 800, and 1600 PPM of lemon waste which were added to pots containing 160 Gr. soils and leaved in incubator for 0, 2, 4, 8, and 16 weeks at 27-30°C, pot moisture were kept at field capacity during the experiment. At dates of 0, 2, 4, 8, and 16 weeks after treatment the treated soils were sampled and physico-chemical properties were determined (table 2).

RESULT and DISCUSSION

According the results, the pH of treated soils with lemon waste decrease and organic mater increase slightly with increase in amount of lemon waste and time of incaution.

The availability of Cu, Zn, Mn, Fe, and P in treated soils increased with increasing the amount of lemon waste and time of incubation.

It is recommendable that the agricultural waste can be used as green sources of fertilizer for land and environment restoration.

Table 2: the effects of amount of lemon waste and time of incubation chemical properties of treated soils with lemon waste

OM	CCE	Cu	Zn	Mn	Fe	P	pH	treatments
(%)		(PPM)						Time(weeks)
1.90b	65.9a	0.56b	1.98d	15.02c	4.27d	448a	7.87a	0
2.06b	67.6a	0.64b	3.16d	16.64c	11.94c	339b	7.82a	2
2.10a	69.2a	0.76a	4.00c	17.48c	15.56b	259c	7.75a	4
2.13a	67.0a	0.76a	6.77b	20.97b	16.83ab	333b	7.57b	8
2.24a	63.0a	0.84a	8.40a	22.28a	18.31a	347b	7.41b	16
								Conc.(ppm)
1.65b	66.9a	0.56b	4.29b	17.19c	5.39d	336b	7.81a	0
1.98b	65.7a	0.71a	4.61b	19.77bc	11.62c	336b	7.80a	100
2.14a	69.7a	0.71a	4.9ab	20.98b	12.48c	336b	7.72ab	200
2.18a	69.9a	0.72a	5.15ab	24.16a	13.26c	347b	7.66ab	400
2.21a	67.9a	0.76a	5.15ab	26.01a	16.42b	371a	7.60bc	800
2.36a	69.6a	0.81a	6.15a	26.76a	20.89a	376a	7.53c	1600

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