EFFECT OF ENDOMYCORRHIZA (*Glomus* sp.) AND ORGANIC MATTER ON CACTUS PEAR (*Opuntia albicarpa*) GROWTH IN TWO SOIL TYPES

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Introduction

- There are over 360 species of *Opuntia* genus.
- They have a wide distribution in the Americas.
- Mexico is considered one of the two center of origin and dispersion of this genus, and it has the greatest number of species and cultivars of cactus pear in the world.
- *Opuntia* species are cultivated for different purposes.

Introduction

- Important in Mexico.
  - Culture
  - Uses
    - Food
    - Medicinal
    - Industrial

- The State of Mexico is the main producer with 42% of the national production.

General Objective

- To study the effect of organic matter and endomycorrhiza on cactus pear (*Opuntia albicarpa*) growth in two soil types under greenhouse conditions.

Materials and methods

- The present study was carried out using two soil types from San Luis Potosi State, Mexico. One red (xerosol) and another grey (litosol).
- The study lasted 270 days from planting to harvest and was conducted under greenhouse conditions at Colegio de Postgraduados, Montecillo Campus, State of Mexico, in the spring of 2014.

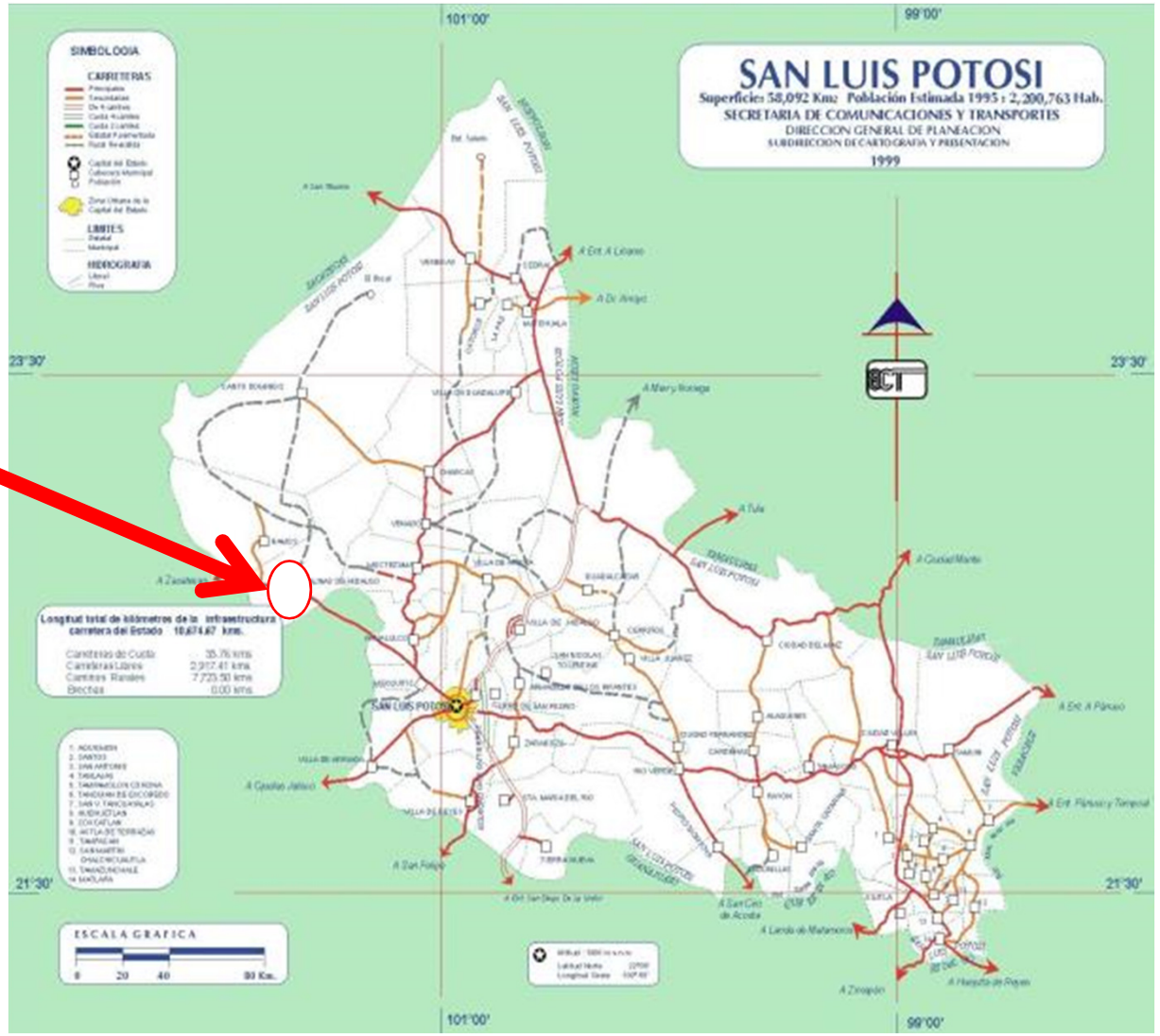
Soil and Greenhouse

Data Collecting

Experimental Site

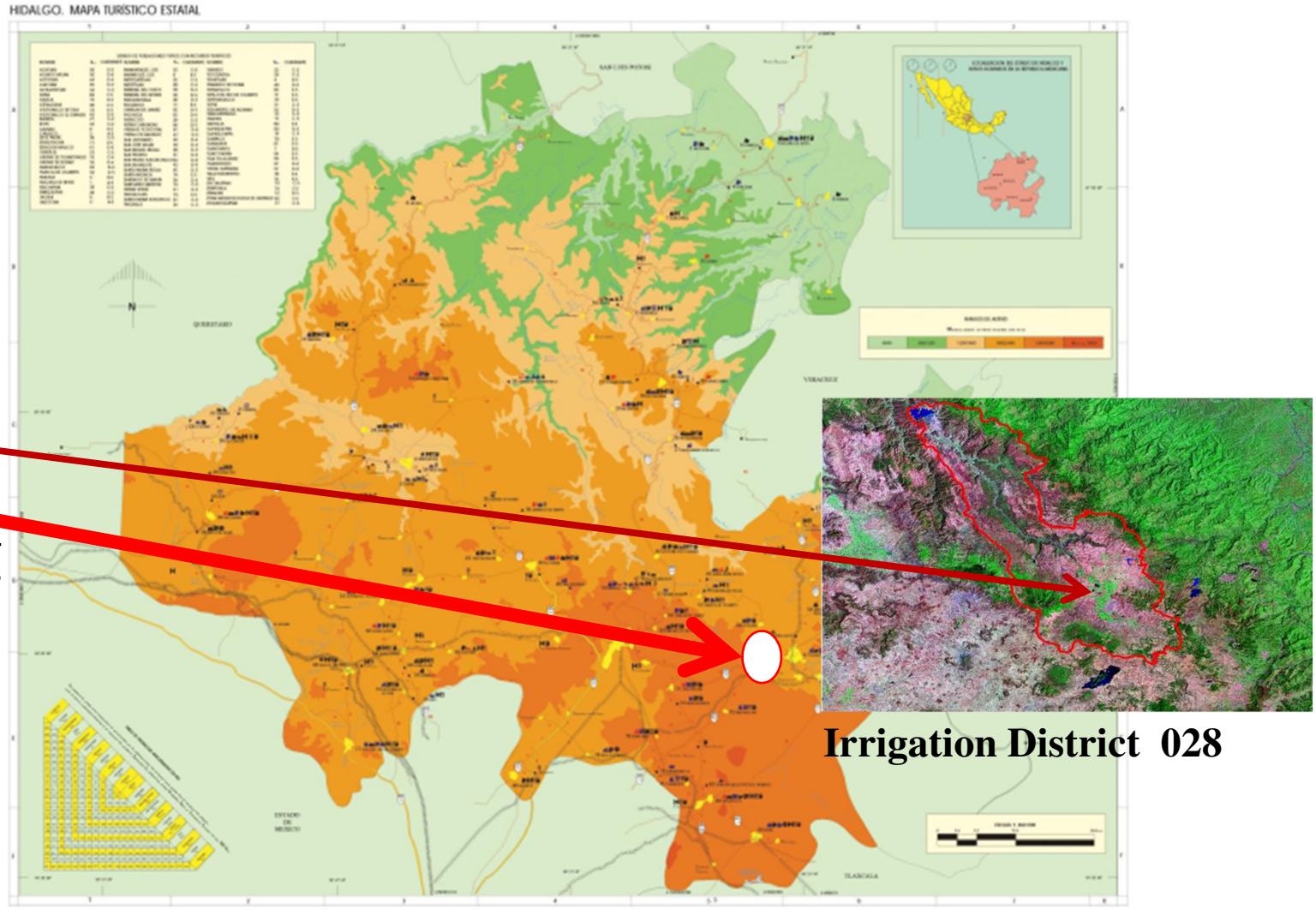
San Luis Potosi State, Mexico.

Soil sampled area

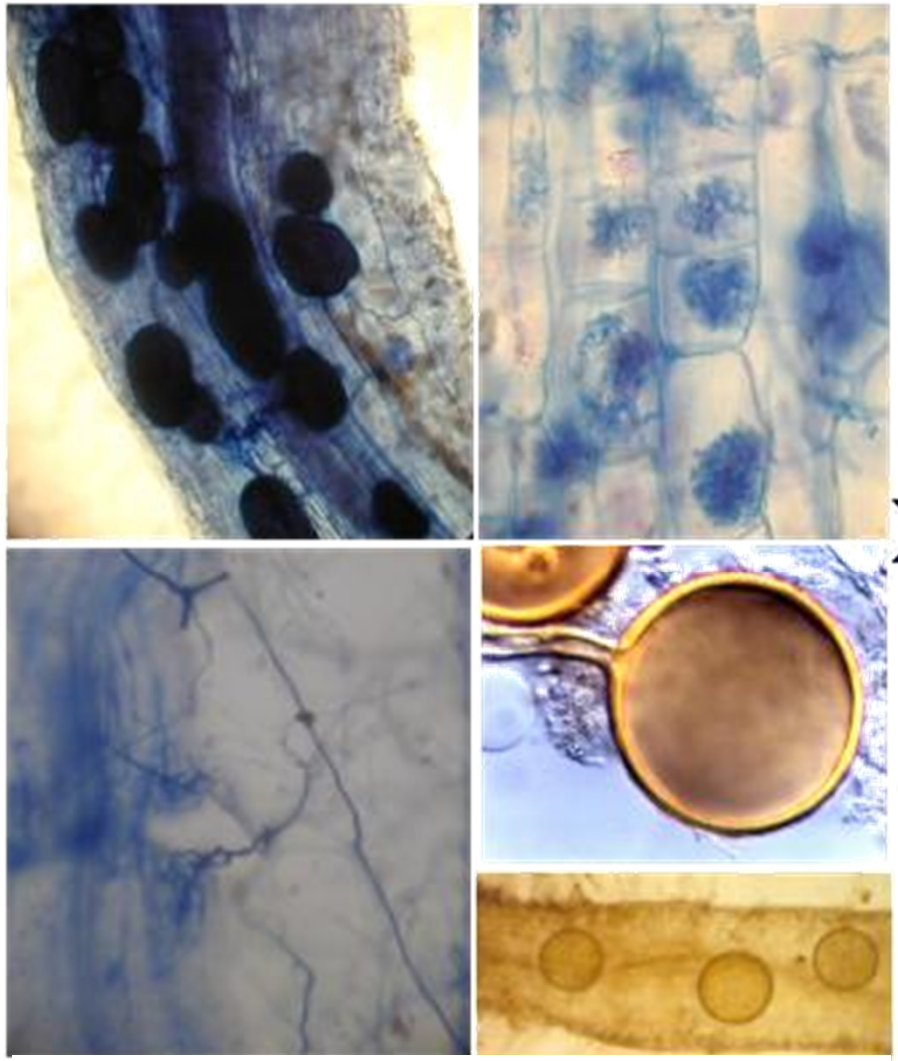


Tulancingo, Hidalgo, Mexico.

Cactus Pear Sampling Area



Mycorrhizal Fungi



Soil characteristics

- Both soil types were collected at the San Luis Potosi State, north Mexico. Grey soil is medium alkaline, the red one is neutral. Both have medium amounts of inorganic nitrogen and a low one of phosphorus. The contents of iron, manganese, and zinc are adequate. Grey soil is deficient in copper, but the red one has sufficient quantity.
- The soil organic matter was determined using the Walkey and Black method, for phosphorus, Olsen was used. Interchangeable bases were measured utilizing ammonium acetate pH 7:1 Normal (CH_3COONH_4), and micronutrients with DTPA (from dietilen-triamino-pentaacetic acid).

Soil characteristics

Soil	SP	EC	pH	OM	N inorg	P
		dS m^{-1}	1:02	%	mg kg^{-1}	
Xerosol (red)	28	0.54	8.3	1.78	35.27	0.85
Litosol (grey)	34.7	0.65	7.07	2.05	28.86	1.07

Soil	K	Ca	Mg	Fe	Cu	Mn	Zn
	mg kg-1						
Xerosol (red)	477.04	6413.24	110.0	12.33	0.11	19.18	1.90
Litosol (grey)	453.58	2249.79	209.6	21.96	2.81	47.96	2.28

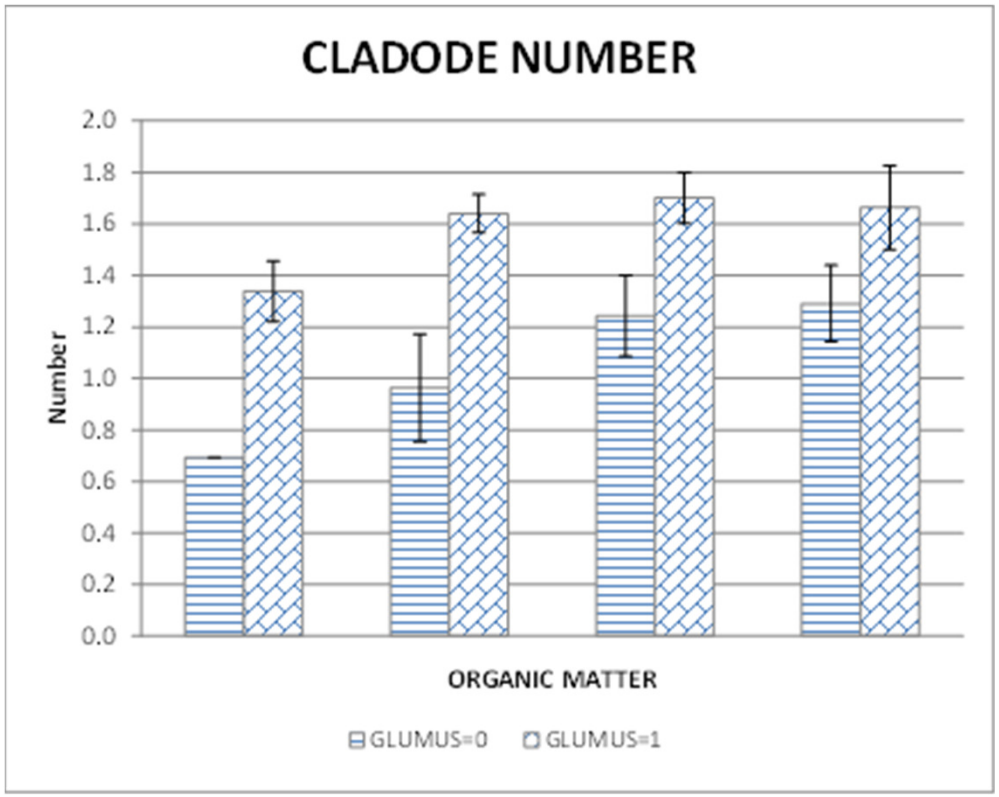
Key: SP=Saturation point, EC=Electric conductivity, pH= Hydrogen potential, OM= Organic matter, N inorg= Inorganic nitrogen.

RESULTS AND DISCUSSION

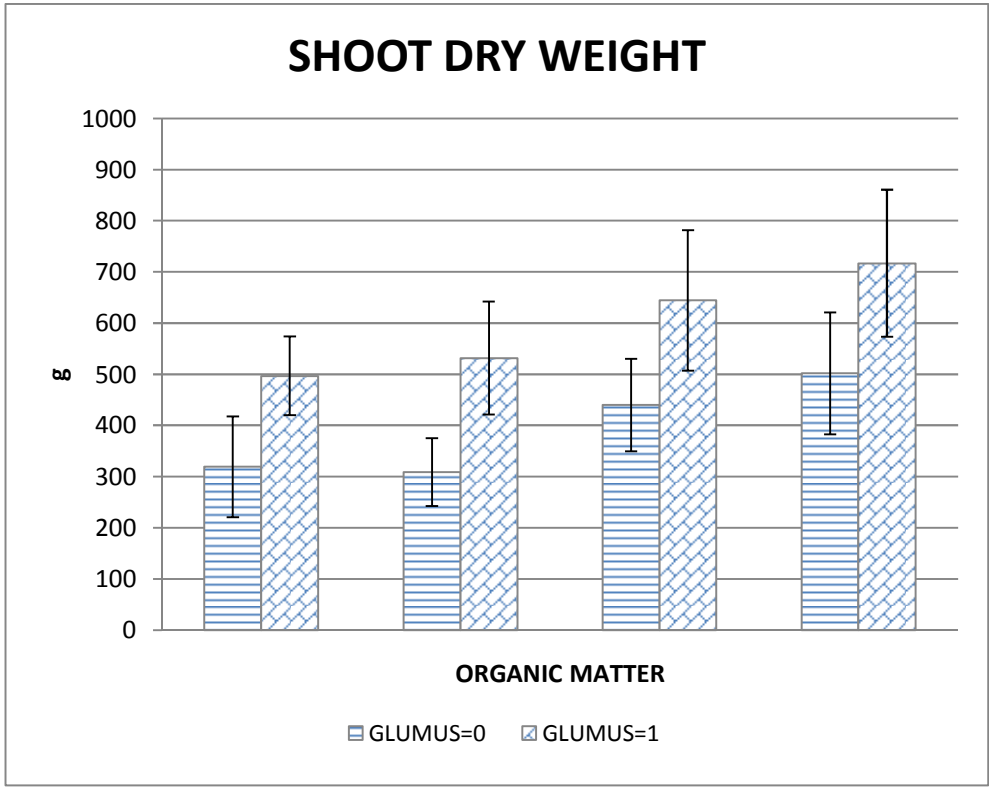
Effect of the inoculation with *Glomus intrarradices*

Glomus intrarradices	Cladode number	Plant height (cm)	Stem diameter (cm)	Cladode width (cm)	Biomass fresh weight (g)
Inoculated	1.58554a	75.625a	3.6625a	7.2792a	597.4
Non inoculated	1.04736b	53.167b	2.1875b	4.8000b	392.2
Glomus intrarradices	Biomass dry weight (g)	Root fresh weight (g)	Root dry weight (g)	Root volume (cm^3)	Root length (c
Inoculated	217.25a	5.5417a	2.7792a	9.2917a	26.20
Non inoculated	143.54b	3.9167b	1.8333b	5.7917b	20.45

Effect of Inoculation and Organic Matter



The treatments are from left to right: 0, 25, 50, and 75 t ha^{-1} of organic matter. GLUMUS=0: Noninoculated, GLUMUS=1: Inoculated with *Glomus intrarradices.*



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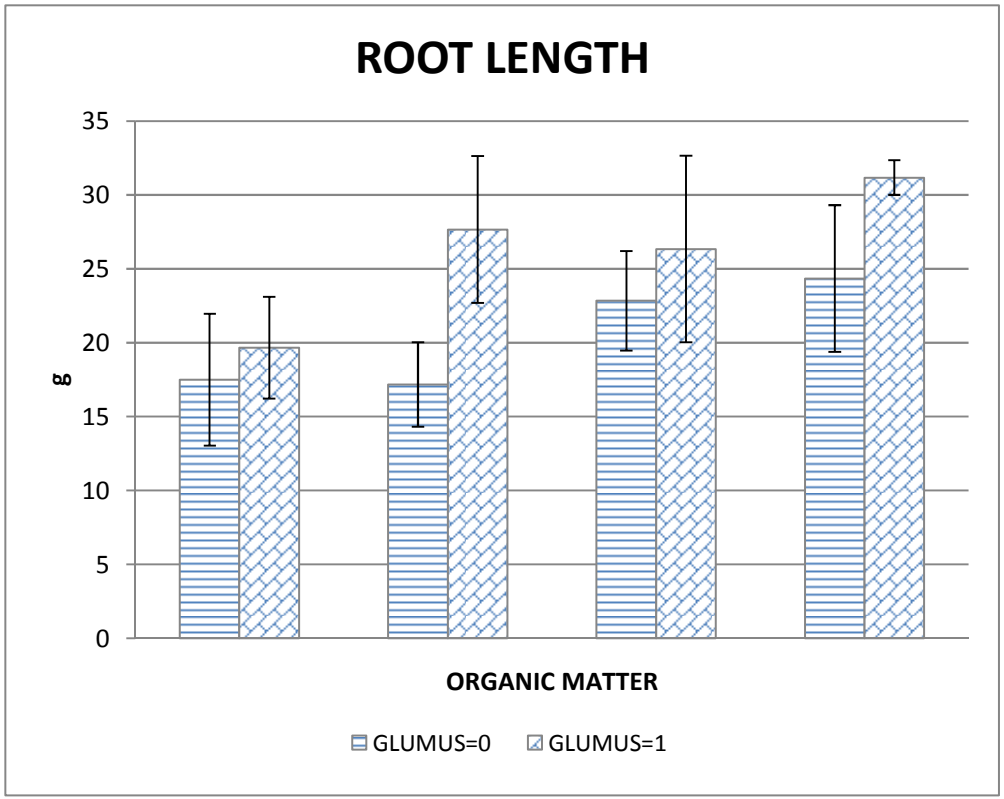
Effect of Inoculation and Organic Matter 2



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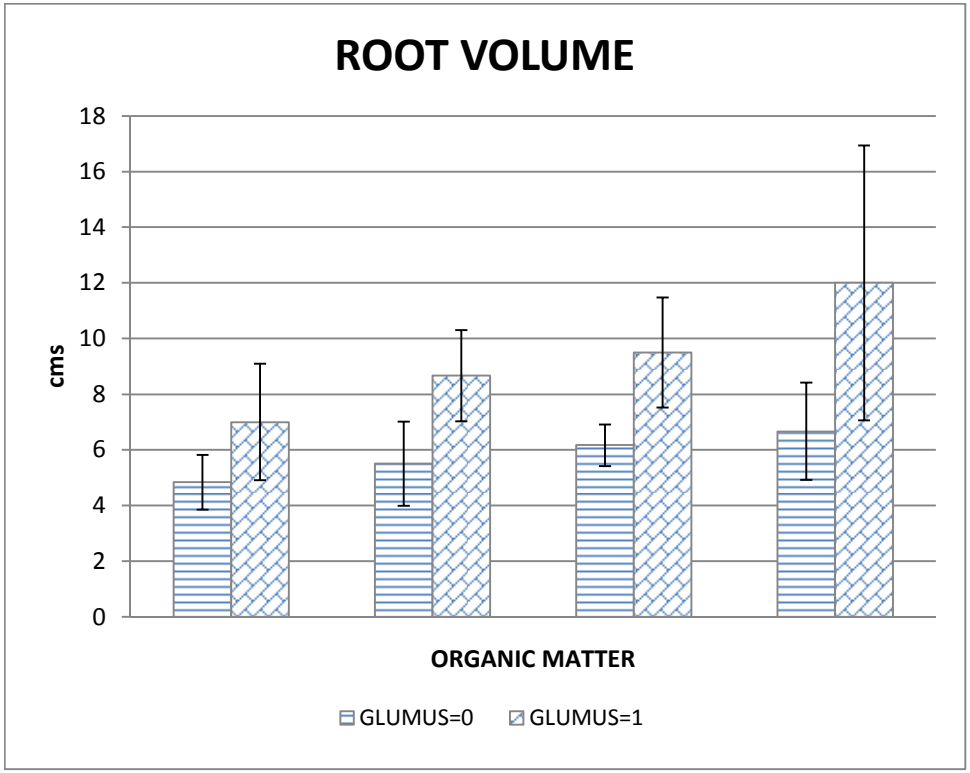

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Effect of organic matter

Organic matter (ton ha^{-1})	Cladode number	Plant height (cm)	Stem diameter (cm)	Cladode width (cm)	Biomass fresh weight (g)
0	1.01575c	51.250c	2.2167b	4.9750c	408.00c
25	1.30164b	62.667b	2.6083ab	5.6833bc	420.00bc
50	1.47153a	67.417b	3.2500ab	6.2500ab	542.17ab
75	1.47690a	76.250a	3.6250a	7.2500a	609.33a
Organic matter (ton ha^{-1})	Biomass dry weight (g)	Root fresh weight (g)	Root dry weight (g)	Root volume (cm^3)	Root length (cm)
0	166.08a	4.4167a	1.9750a	5.9167b	18.583c
25	155.17a	4.3333a	2.1250a	7.0833ab	22.417bc
50	190.00a	4.8333a	2.2083a	7.8333ab	24.583ab
75	210.33a	5.3333a	2.9167a	9.3333ab	27.750a

Conclusions

- Mycorrhizal inoculation provided higher cactus pear root growth and thus promoted better shoot development. The application of organic matter, as vermicompost, improved plant growth too. The soil type did not affect plant growth. Mycorrhiza can be useful to improve mineral nutrition. These fungi can increase yields, and reduce cost of production in cactus pear plantations. Vermicompost is a better alternative to apply organic matter in this crop.