Mycorrhizal effectiveness on growth and tolerance of *Nerium oleander* plants, at ore disposal sites located in NE Chalkidiki

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Phytostabilization of mine tailing is complicated by the fact that they are notoriously adverse to plants.

The establishment of a green cover should be considered to change the physical and chemical properties of the substrate in order to be suitable for plant colonisation

Plant roots are the interface zone among the inorganic environment and the living plant tisues.

The majority of terestrial plants form an oblicatory symbiosis caled mycorrhiza

The symbiosis is among the plant roots or rhizomorphs, and soil born fungi.

The plant taxa are from Angiosperms Gymnosperms, Gametophytes, Pteridophytes, and Sporophytes. while the fungi are from the Basidiomycota, Ascomycota and Glomeromycota.

The study of plants without their mycorrhizas is the study of artefacts. The majority of plants, strictly speaking, do not have roots; they have mycorrhizas.

BEG Committee, 25th May, 1993

Mycorrhizas, not roots, are the chief organs of nutrient uptake by land plants (Smith and Read 1997)

The most abudant type of mycorrhiza in the terestrial ecosystems are those among plants and the fungal phylum of the Glomeromycota, forming the arbuscular mycorrhizal symbiosis (AMF)

Hypothesis tested:

Is mycorrhyzal symbiosis a succesful strategy to restrict the uptake of heavy metals including even micronutrients if the dose exceeds threshold levels?

Does mycorrhizal symbiosis provides enough resistance to some metals which are not essencial to several organisms?

Terrestrial plants form Arbuscular mycorrhizal symbiosis

AM Symbiosis could change the hormonal balance to the the plant.

AM symbiosis improves plant nutrition with low mobility cations such as PO_4^{+3} HPO_4^{+2}

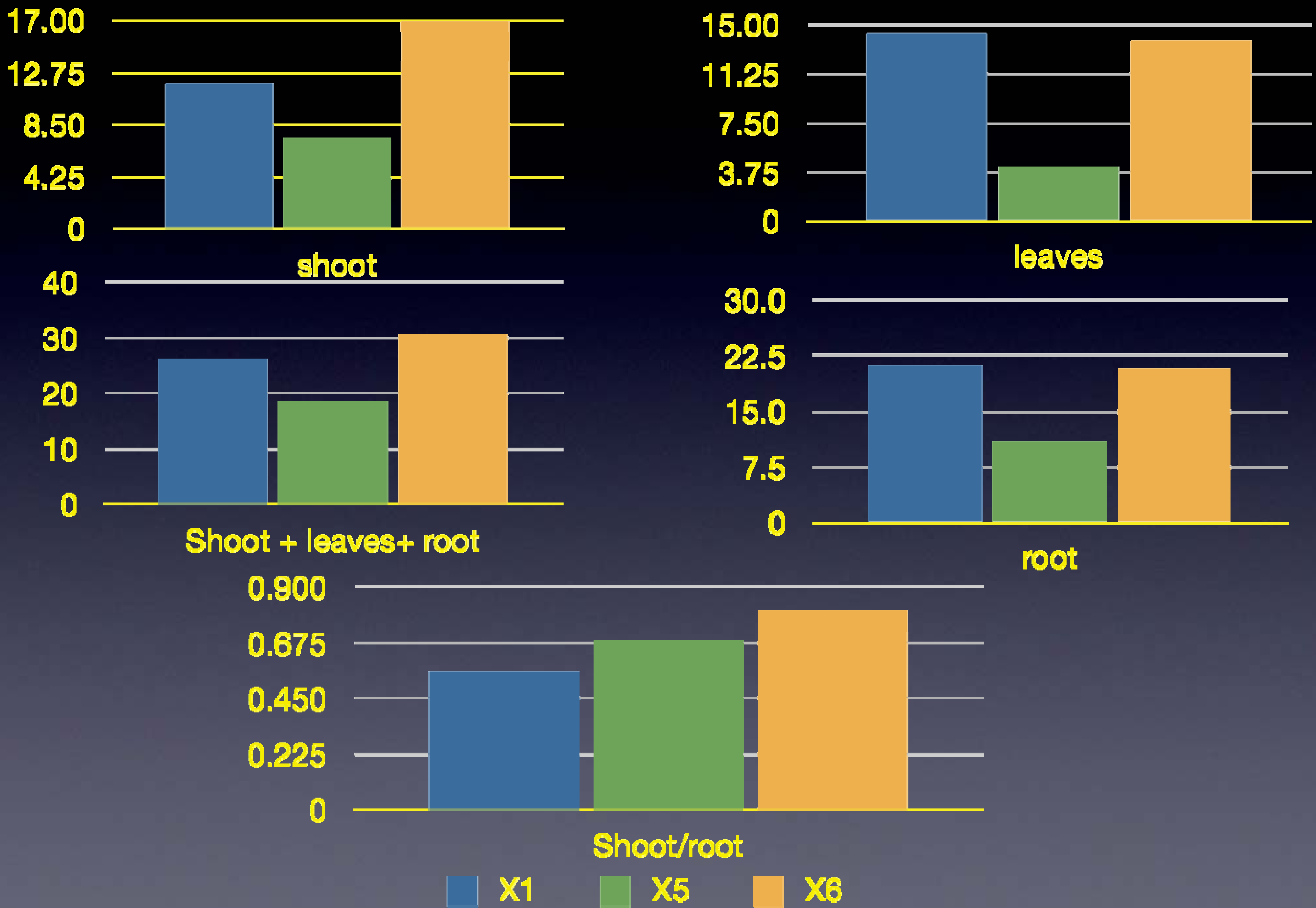
Improve the root growth

Materials and methods

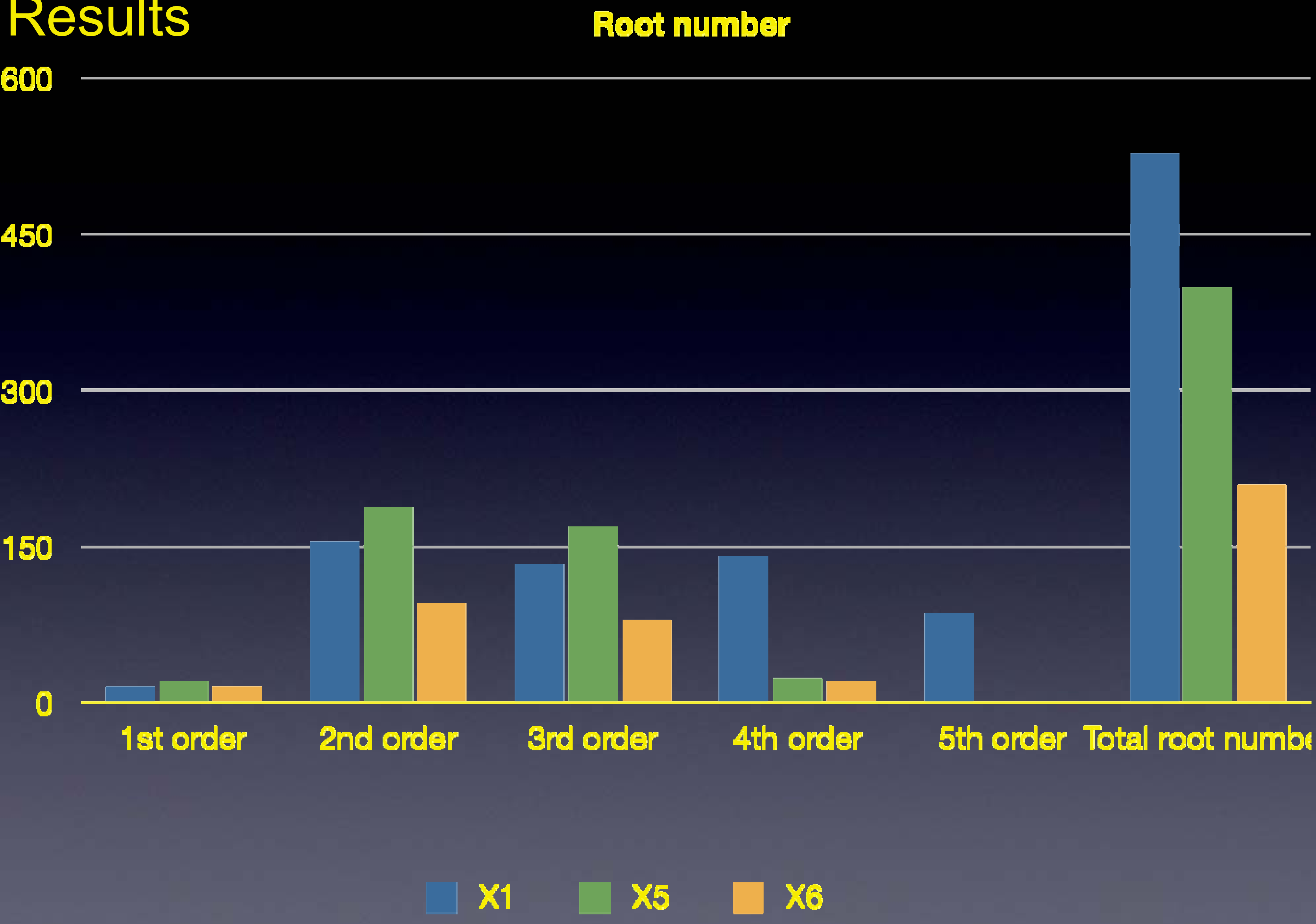
	pH	Microbial. Biomass	O.M	$EC_{25}{}^{0}C$	Na	K	Mg	C.E.C	P	NO_3	Zn	Cu	Fe	Mn
Treatment	(1:2) H_2O	µg N/g soil	%	(mS/cm)	(me/100g soil)				(ppm)					
X1	7.48	2.41b	3.28a	1.8a	0.12	1.45	0.62	24.35	22.0	28.93	49.3b	6.3c	4.15b	12.0a
X5	5.8	0.88a	-	3.2b	0.12	1.24	1.18	14.9	24.75	25.11	267c	2.85b	2.17a	3022b
X6	6.5	1.99b	3.15a	0.53a	0.08	0.73	0.57	15.56	37.75	19.66	34.1a	1.35a	6.76c	24.5a

Chemical properties of the three different growth material treatments used. X1 treatment is a mixture consisting of filter press material from sulphide minerals (40%); byproducts electrochemical processed of pyrolusite (30%); natural soil (10%); rice chaff (10%);rock material (10%).X5 treatment only filter press material used as growth medium. X6 natural soil, used as control.

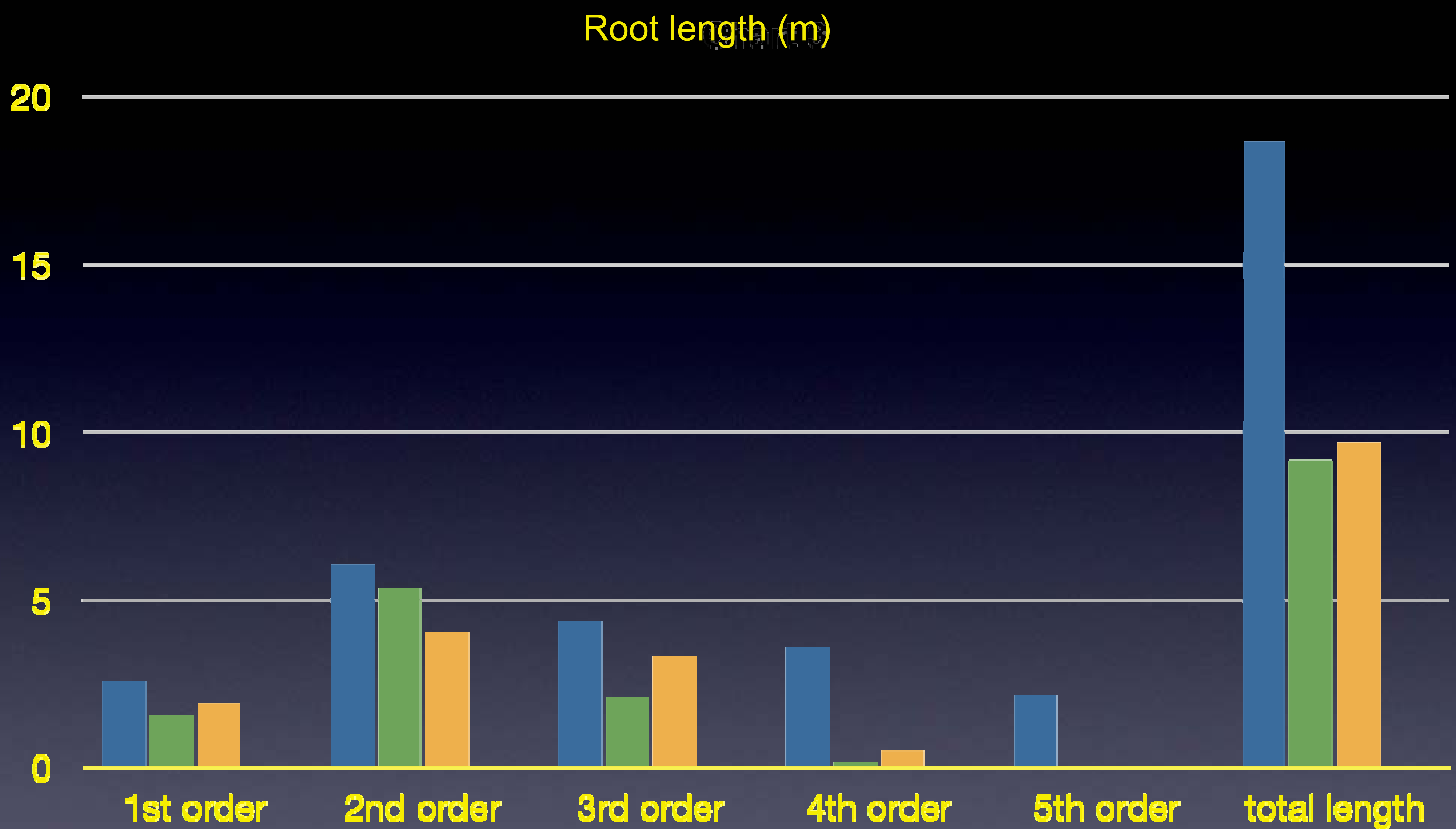
Results (Biomass g)



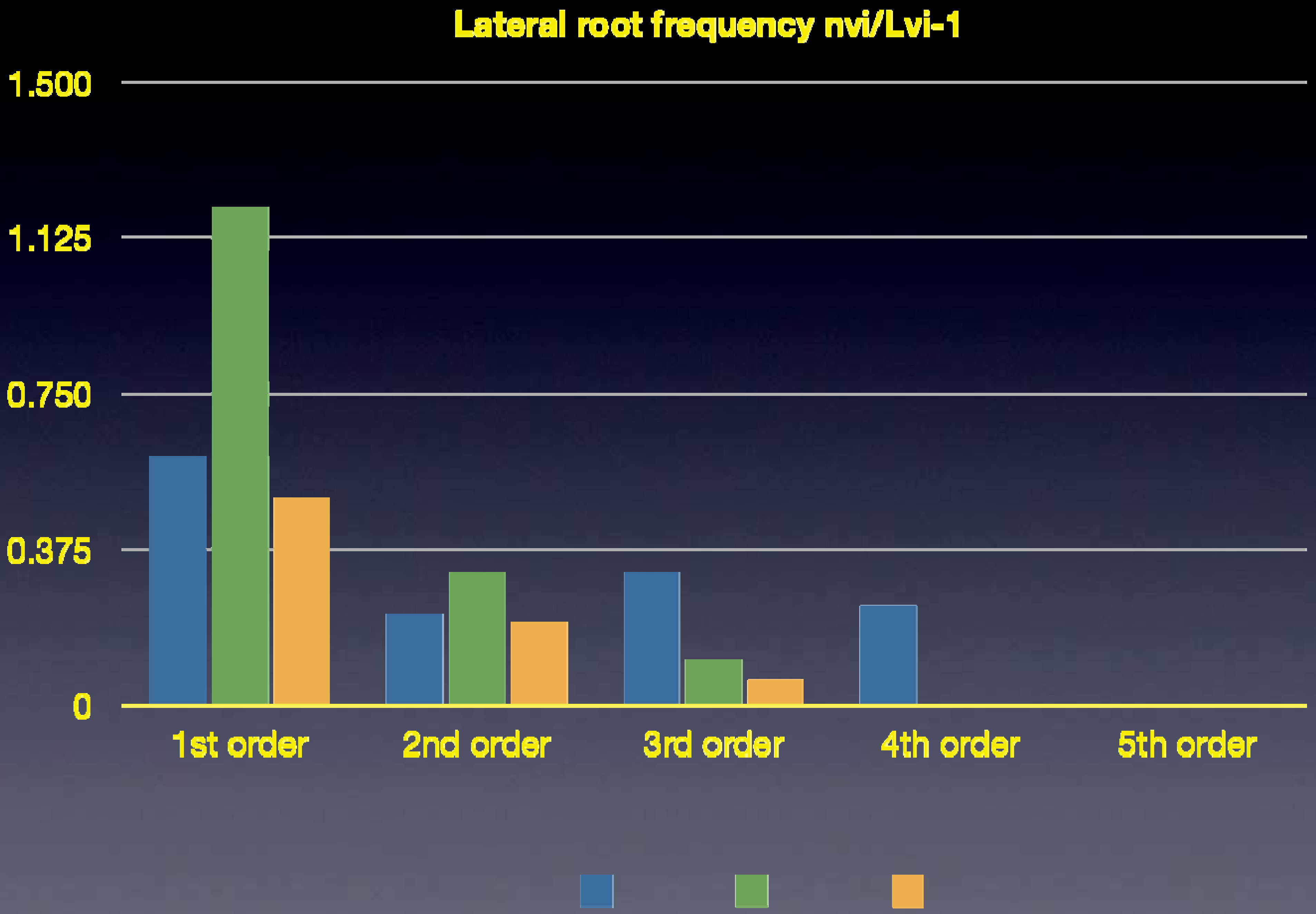
Results


Root number
600
450
300
150
0
1st order
2nd order
3rd order
4th order
5th order
Total root numbe
X1
X5
X6

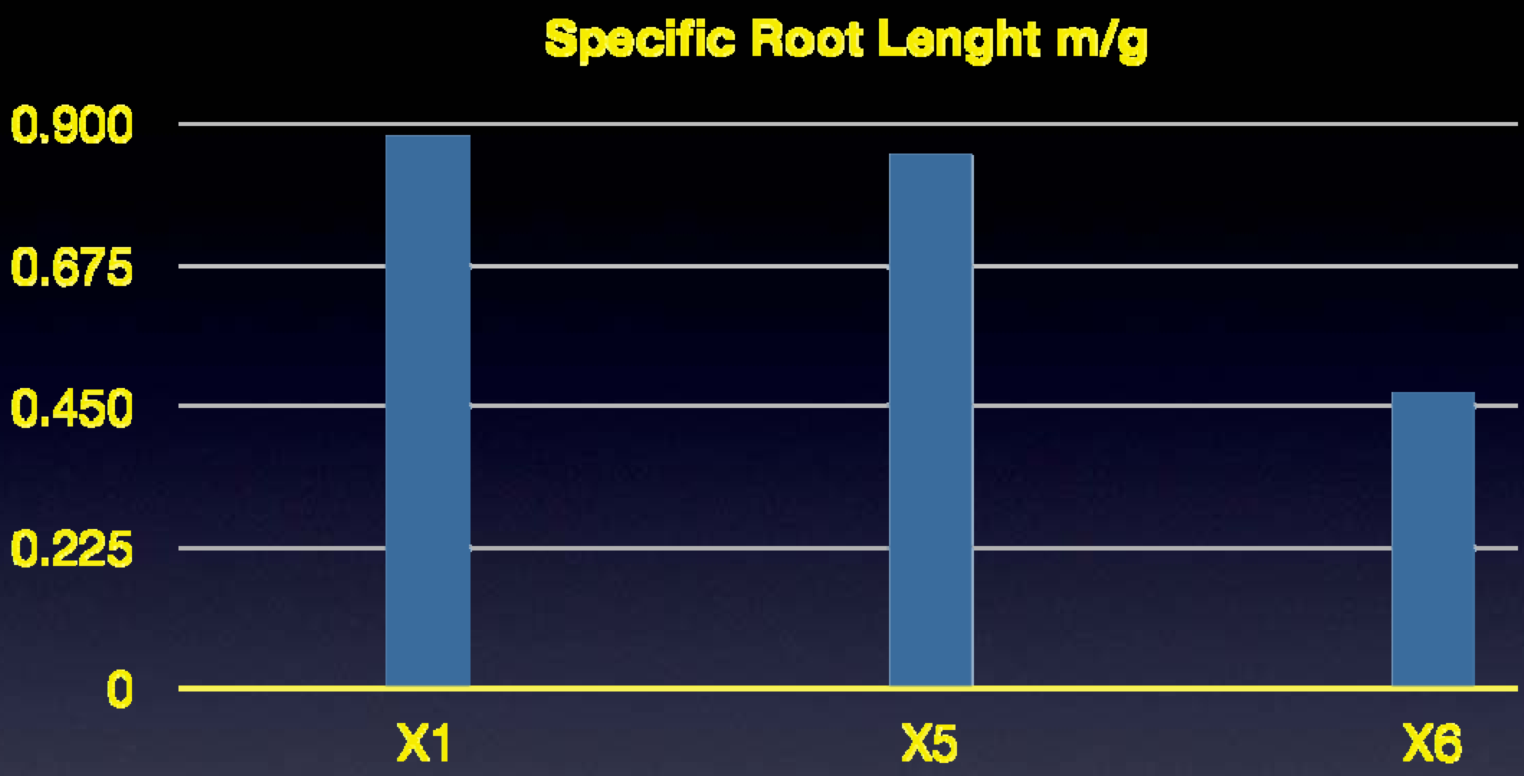
Results


Root length (m)
20
15
10
5
0
1st order
2nd order
3rd order
4th order
5th order
total length

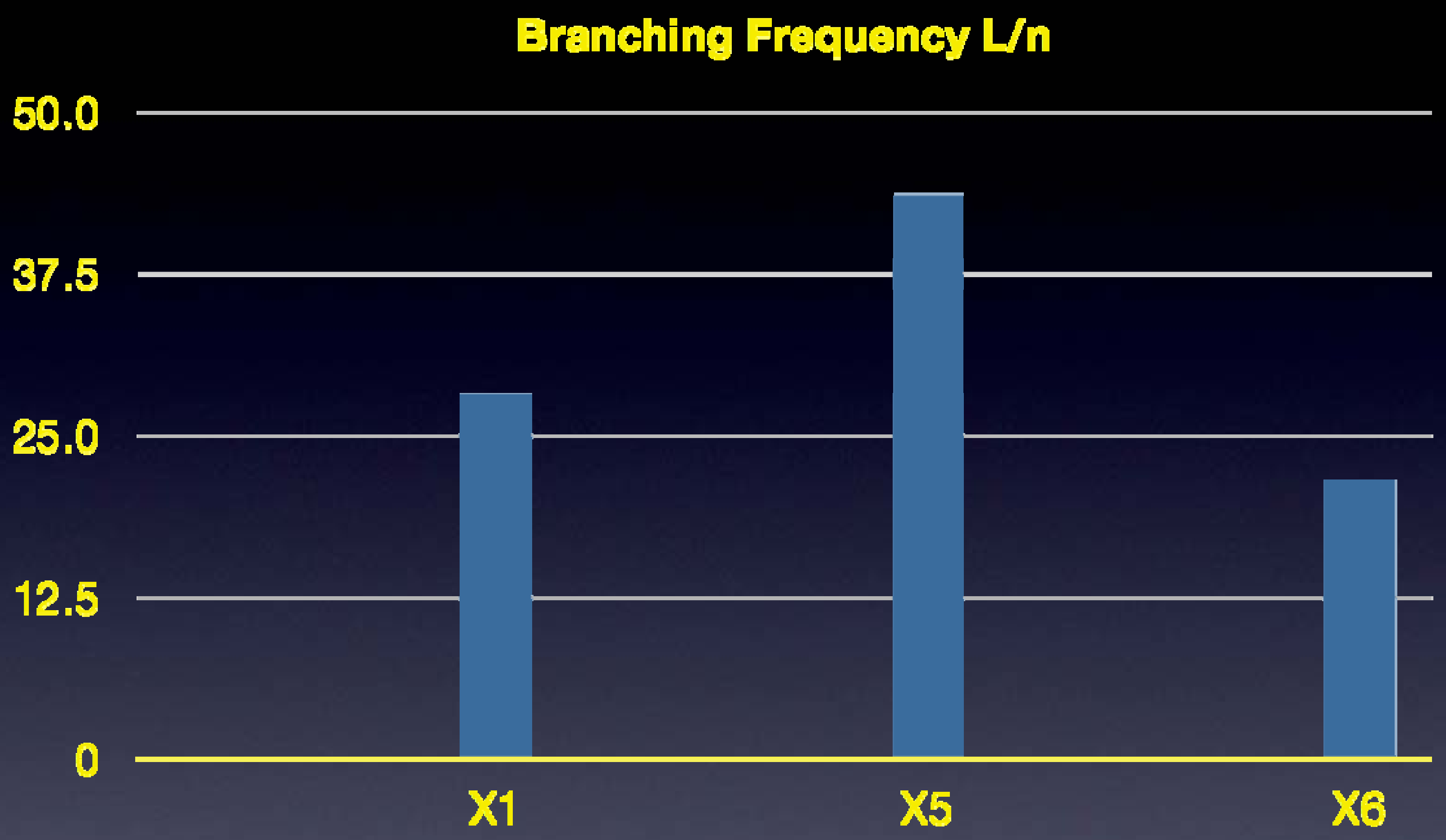
Results


Lateral root frequency nvi/Lvi-1
1.500
1.125
0.750
0.375
0
1st order
2nd order
3rd order
4th order
5th order

Results

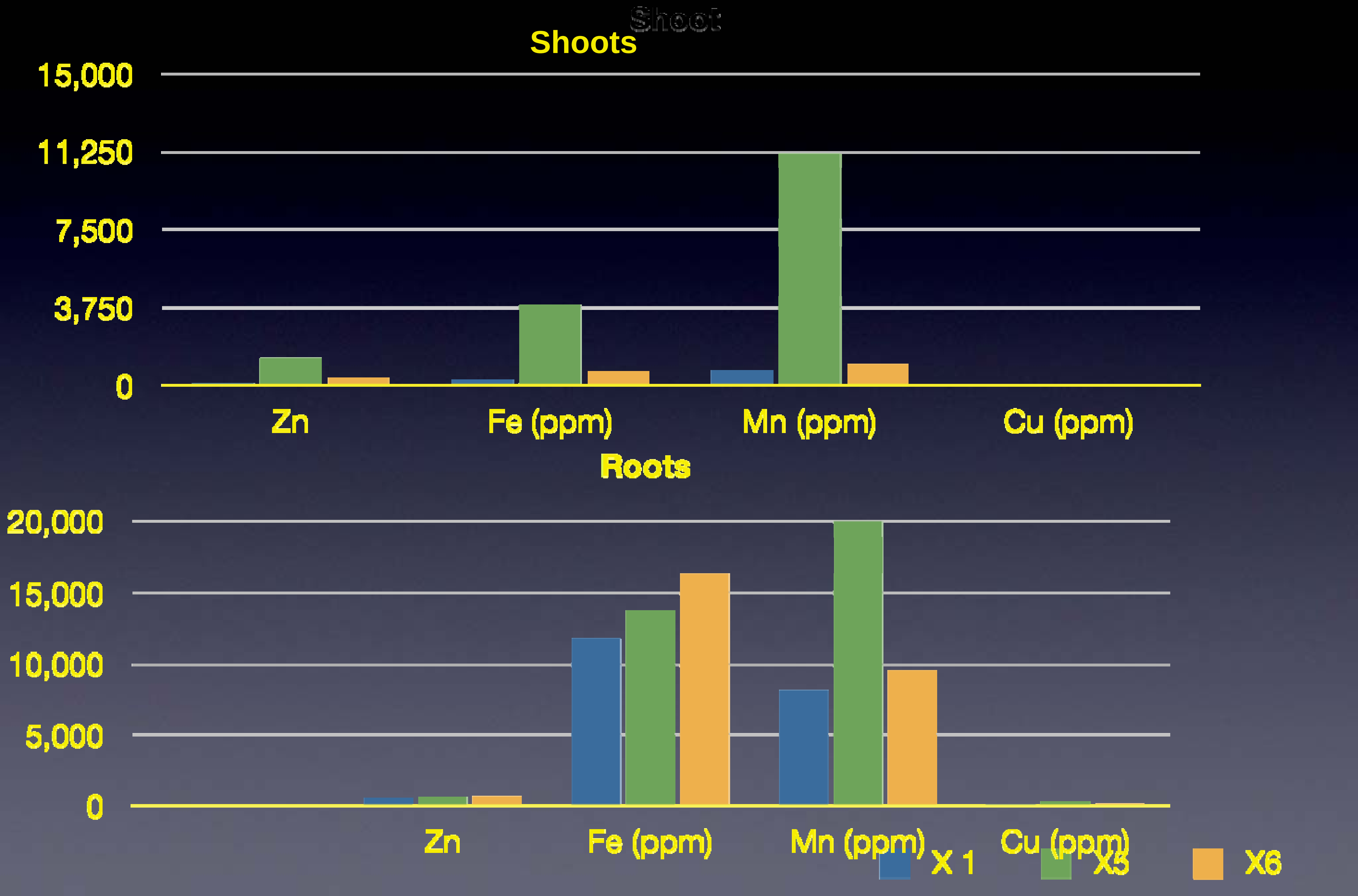


Results



Results

The concentration of heavy metals (ppm) in shoots and roots of *Nerium oleander*.



Discussion

Nerium plants grown better after inoculation with commercial AM fungi

Commercial inoculum based on *Glomus intraradises* could be a good solution on contaminated site restoration due to the growth pattern of the fungus

Mycorrhizal symbiosis resulted to an increased root branching , a possible response from the plant after AMF colonisation, a mechanism ensuring the survival of the plant at harsh soil conditions.

Thank you !!