تأثير نقص الفوسفور على الفلفل

اعداد الطالب : نعيم سمارة

Introduction:

All plants need micronutrients and macronutrients. Macronutrients include carbon, hydrogen, oxygen, nitrogen, phosphorus and potassium, (Plants get their carbon, hydrogen and oxygen from air and water, The other macronutrients come from the soil or from fertilizers). Micronutrients include iron, manganese, boron, zinc and copper, calcium, magnesium and sulphur plants are also need it, and When plants can't get enough of one or more nutrients, they become deficient in them.

Water Culture systems are about the simplest of all six types of hydroponic systems. While technically simple, they are still very effective for growing plants hydroponically. Not only do a lot of home hydroponic growers really like using water culture systems, but many commercial growers use this type of system on a large scale as well. Mainly because the water culture systems is a simple and easy concept. It's also a very inexpensive type of system to build, and another reason why it's popular with home growers as well. Even though the concept is simple, there are plenty of imaginative ways to use and build water culture systems out of different materials.

Objective:

we do this experiment to know and see many thing especially the symptoms of nutrient deficiency on pepper while we cultivate it in water solution in incubator .

will test the deficiency of the phosphorus and the effect of the absence of this element on plant growth and development

*In this article we will focus our attention on phosphorus element:

Phosphorus: is a chemical element with symbol P and atomic number 15.
A multivalent pnictogen, phosphorus as a mineral is almost always present in its maximally oxidized state, as inorganic phosphate rocks. Elemental phosphorus exists in two major

forms—white phosphorus and red phosphorus—but due to its high reactivity, phosphorus is never found as a free element on Earth.

The first form of elemental phosphorus to be produced (white phosphorus, in 1669) emits a faint glow upon exposure to oxygen – hence its name given from Greek mythology, meaning "light-bearer" (Latin Lucifer), referring to the "Morning Star", the planet Venus. The term "phosphorescence", meaning glow after illumination, originally derives from this property of phosphorus, although this word has since been used for a different physical process that produces a glow. The glow of phosphorus itself originates from oxidation of the white (but not red) phosphorus— a process now termed chemiluminescence.

**phosphorus deficiency:*

is a plant disorder associated with insufficient supply of phosphorus. Phosphorus refers here to salts of phosphates (PO_4^{3-}), monohydrate phosphate (HPO_4^{2-}), and dehydrogenates phosphate ($H_2PO_4^-$). These anions readily interconvert, and the predominant species is determined by the pH of the solution or soil. Phosphates are required for the biosynthesis of genetic material as well as ATP, essential for life. Phosphorus deficiency can be controlled by applying sources of phosphorus-based fertilizers such a superphosphate.

Materials:

we use in our experiment many materials and tools for different purpose such as mainly:

- *at first the glass pots to put the transplants in it.*
- *also we use some liquid fertilizers*
- *Polyethylene sheet to provide stability to the transplant.*
- *Straw to allow adding the fertilizers and provide air.*
- *Aluminum foil to cover the glass pots.*
- *Para film to close the bottom of glass pots.*
- *label sheet and marker to write the details.*
- *Meter tool to measure the length of plant.*
- *Finally the Caliber to measure the diameter of plant .*

Method:

We done the experiment by many steps around the semester as follow:

Preparing the glass pots:

- At first we take the glass pots and clean it, then
- fill ¾ the glass pot with distilled water
- We cut an appropriate piece of polyethylene to put it in the top of glass pot to provide stability.
- We make a small cutting in the center toward the margin to insert the transplant .
- We make, also a cutting in some sides of polyethylene sheet to insert the straw.
- When we insert the transplant and straw we put the polyethylene piece on the top of glass pots, then
- We close around it by Para film, then
- We put the aluminum foil around it, and put the label with appropriate details.
- Aerate the solution by blowing air through the delivery tube to supply oxygen for root respiration.

Adding the fertilizers:

- We add these fertilizers to the solution through the straw as follow:

  1- 4 ml of the first solution ($Ca(NO3)2.H2O$)
  2- 2 ml of the second solution ($KNO3$)
  3- 6 ml of the third solution ($MgSo4.7H2O$)
  4- 1 ml of the ninth sol. (iron EDTA)
  5- 1 ml of the tenth sol. (trace)

Collecting data and measures:

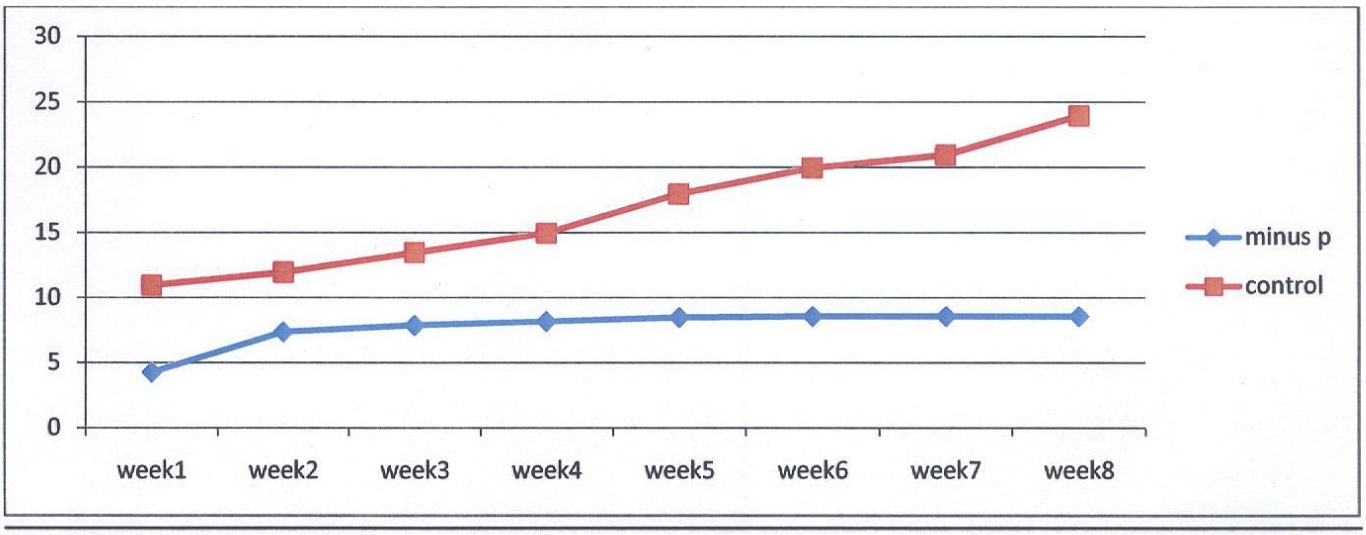
- We collect the data and measures every week (the data that we collect it as the follow: -

- Plant length.
- Stem diameter.
- Number of leaves.
- Number of flowers.
- Number of fruits.

Results:

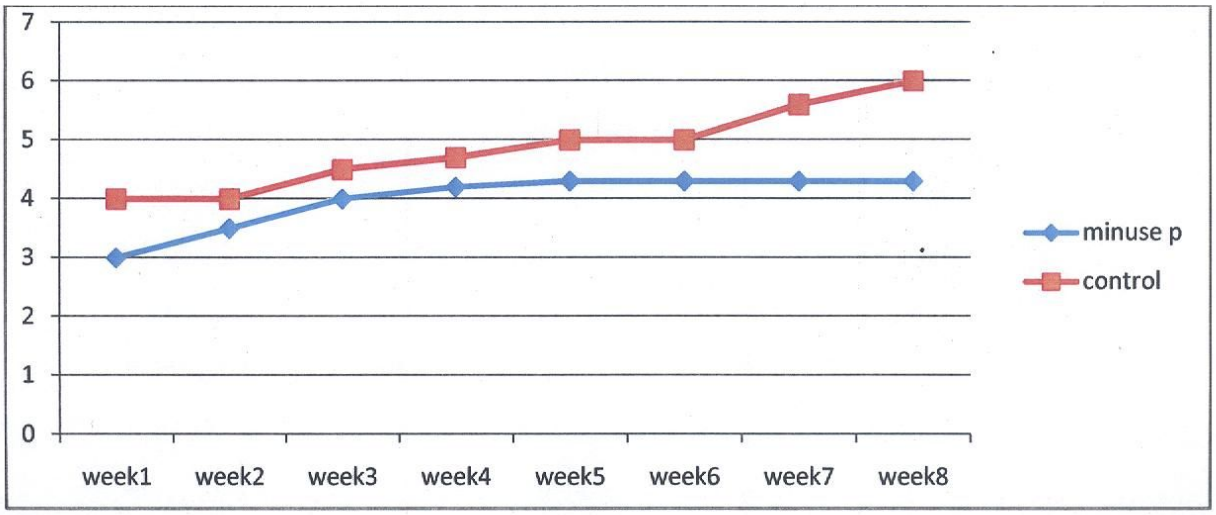
Pepper length:

week	Minus P	Control
Week 1	7cm	11 cm
Week 2	7.4 cm	12 cm
Week 3	7.9 cm	13.5 cm
Week 4	8.2 cm	15 cm
Week 5	8.5 cm	18 cm
Week 6	8.6 cm	20 cm
Week 7	8.6 cm	21 cm
Week 8	8.6 cm	24 cm



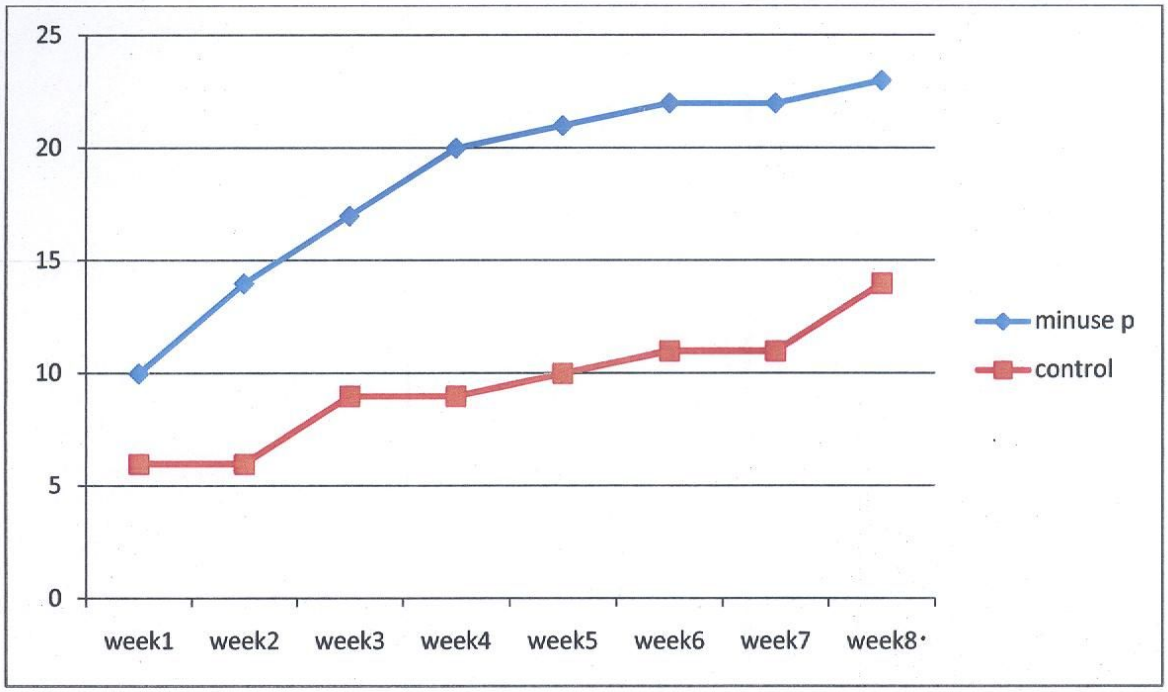
Diameter

week	Minus P	Control
1	3 mm	4 mm
2	4.5 mm	4 mm
3	4 mm	4.5 mm
4	4.2 mm	4.7 mm
5	4.3 mm	5 mm
6	4.3 mm	5 mm
7	4.3 mm	5.6 mm
8	4.3 mm	6 mm



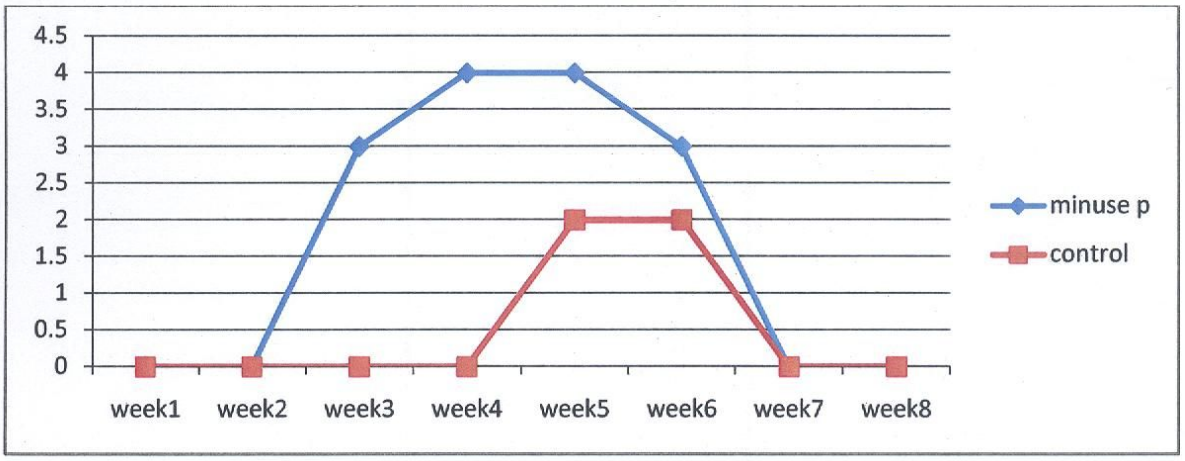
number of leaves

week	Minus P	control
1	10	6
2	14	6
3	17	9
4	20	9
5	21	10
6	22	11
7	22	11
8	22	14



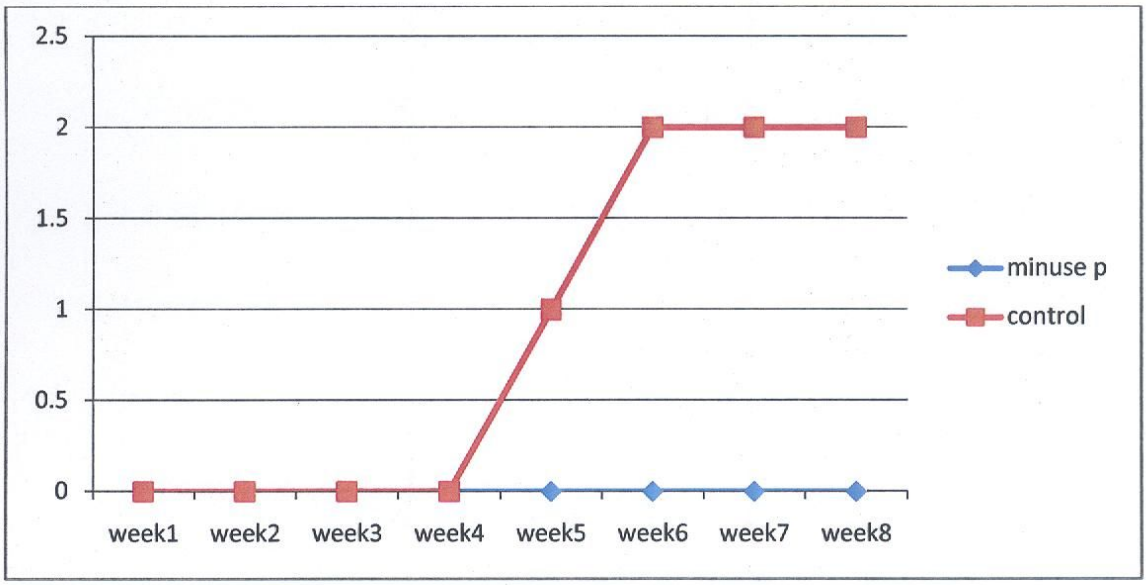
number of flower

week	Minus P	control
1	0	0
2	0	0
3	3	0
4	4	0
5	4	2
6	2	2
7	0	0
8	0	0



number of fruit

week	Minus P	control
1	0	0
2	0	0
3	0	0
4	0	0
5	0	1
6	0	2
7	0	2
8	0	2



Weight	phosphorus	Control
Fresh root	3.7	3.1
Fresh shoot	6.3	7
Dry root	1.1	0.3
Dry shoot	1.9	1.1
Root length	15	18 cm
Fruit number	0	2
weight	0	4.7g

conclusion

the experiment prove that phosphorus is very essential for the plant since the absence of the p cause stunted and stop of the growth and development of the plant and fall of flower (most of the flower fall before open) and no fruit formation at all and the plant was Paleand weak and the apical is rosity

and that is evidence to prove that Phosphorus is a mineral that is vitally important for the plant growth and development since the plant was unable to continue his growth and development in the absence of phosphorus and that why phosphorus are held in the labile pool , to protect this precious element from lost .