Nano technology in fertilization and pest control of African crops specially in sub-Sahara regions.

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Introduction

Matter and Energy are manifestations of the universe they exist in a variety of forms and interact with each other in many ways.

Nano means 10^{-9}. (Nanometer is one thousand Millionth of a Meter)

To understand how small one nm is let us see few comparisons

1. *A Red blood cell is approximately 7000nm wide.*
2. *Water Molecule is almost 0.3nm across.*
3. *Human hair which is about 80,000nm wide.*

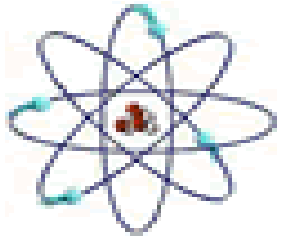
The nanoscale

- *'Nano' is the unit prefix representing 10^{-9}.*

prefix	symbol	meaning
tera	T	10^{12}
giga	G	10^{9}
mega	M	10^{6}
kilo	k	10^{3}
milli	m	10^{-3}
micro	μ	10^{-6}
nano	n	10^{-9}
pico	p	10^{-12}

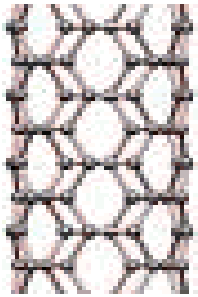
Some common unit prefixes

Why Nanoscale?



atom

0.1 nm



carbon nanotube diameter

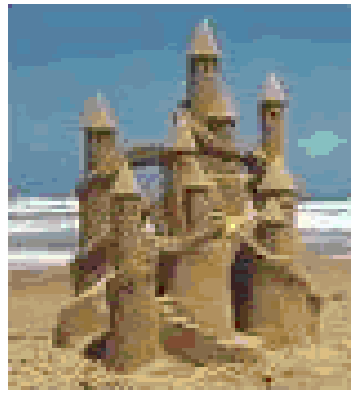
5-10 nm

transistor

35 nm

red blood cell

10 µm



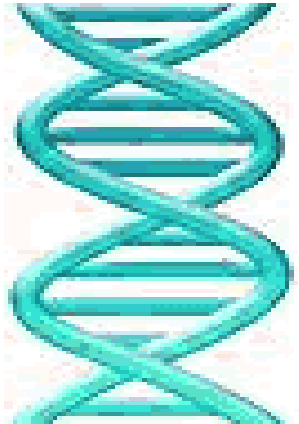
grain of sand

1 mm

10^{-1} 10^{0} 10^{1} 10^{2} 10^{3} 10^{4} 10^{5} 10^{6} nm

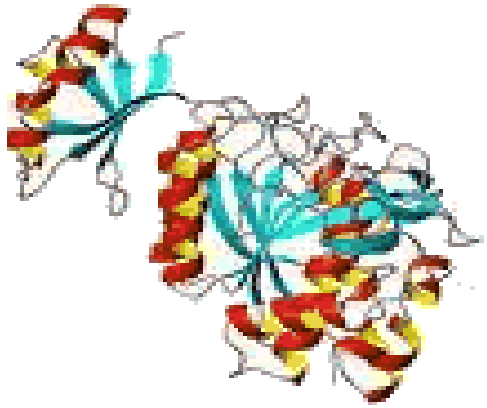
1 nm

DNA diameter



10 nm

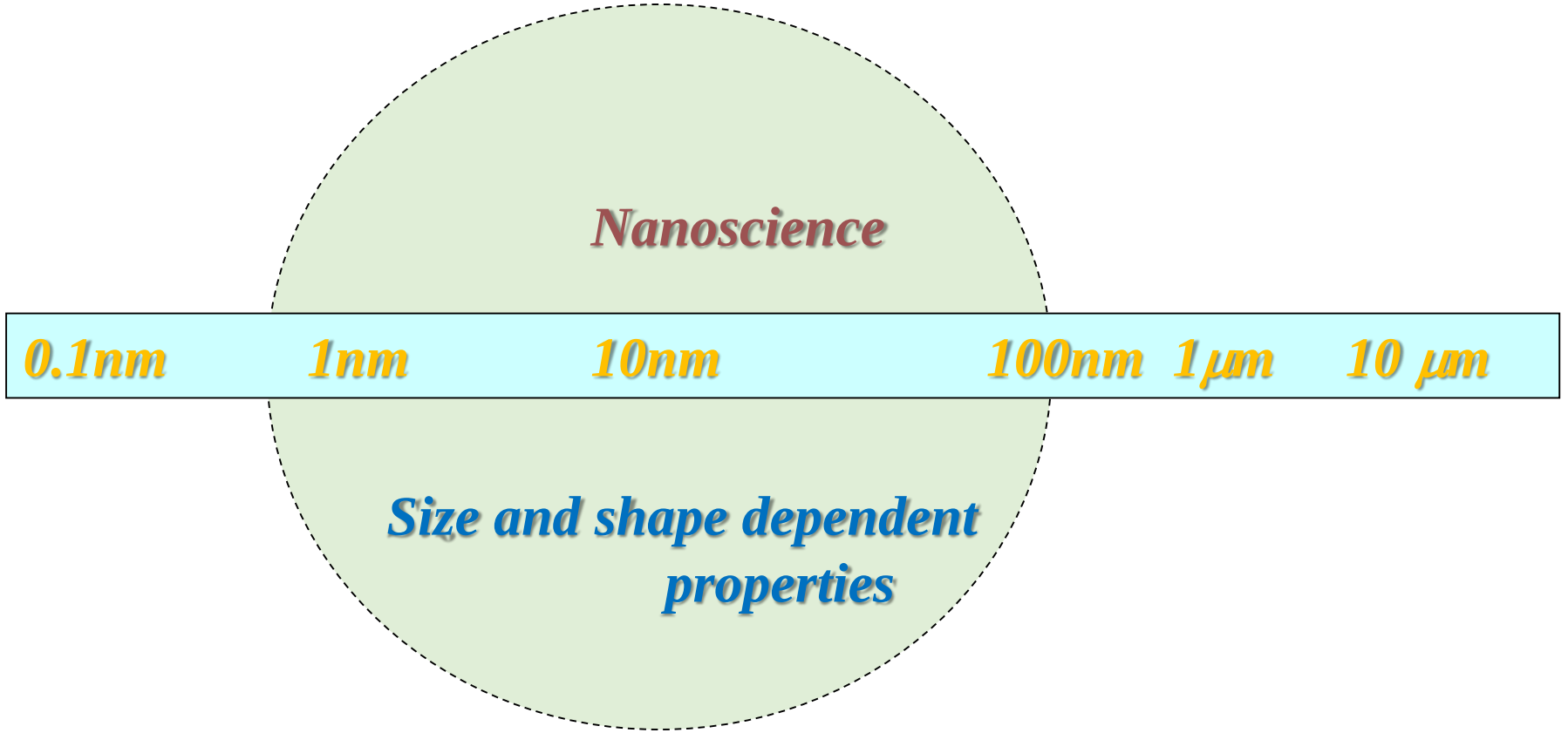
protein



150 µm

human hair diameter

Actual physical dimensions relevant to Nanosystem



Nanometer scale : The length scale where corresponding property is size & shape dependent.

Agriculture

Nanotechnology

Applications in Agriculture

NANO FERTILIZERS

- *Agriculture is always the backbone of many developing countries.*
- *In agriculture the main reason to use fertilizer is to give full-fledged macro and micro nutrients which usually soil lacks.*
- *35-40% of the crop productivity depends upon fertilizer, but some of the fertilizer affects the plant growth directly.*
- *To overcome all these drawbacks a smarter way i.e., nanotechnology can be one of the source.*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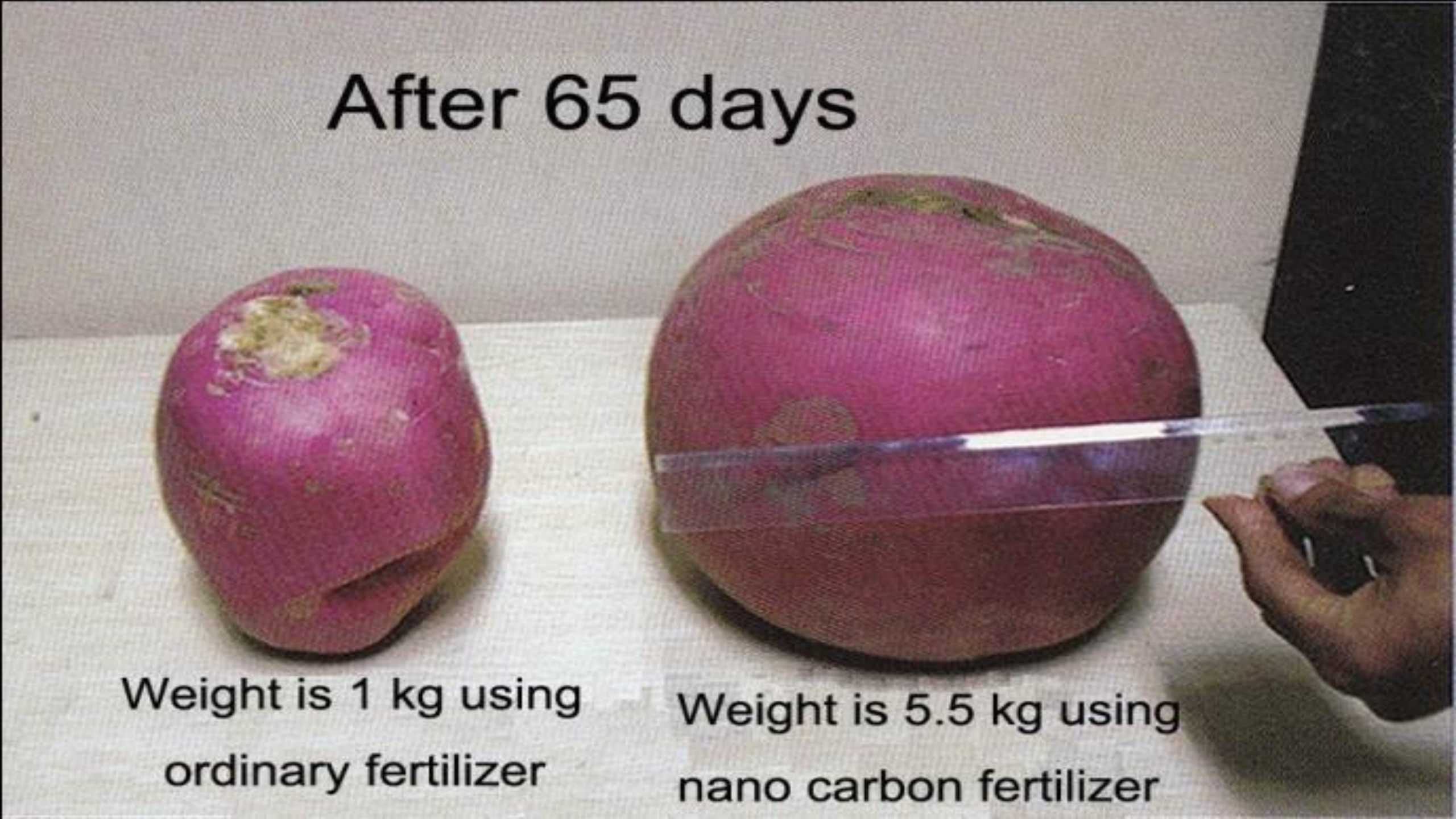
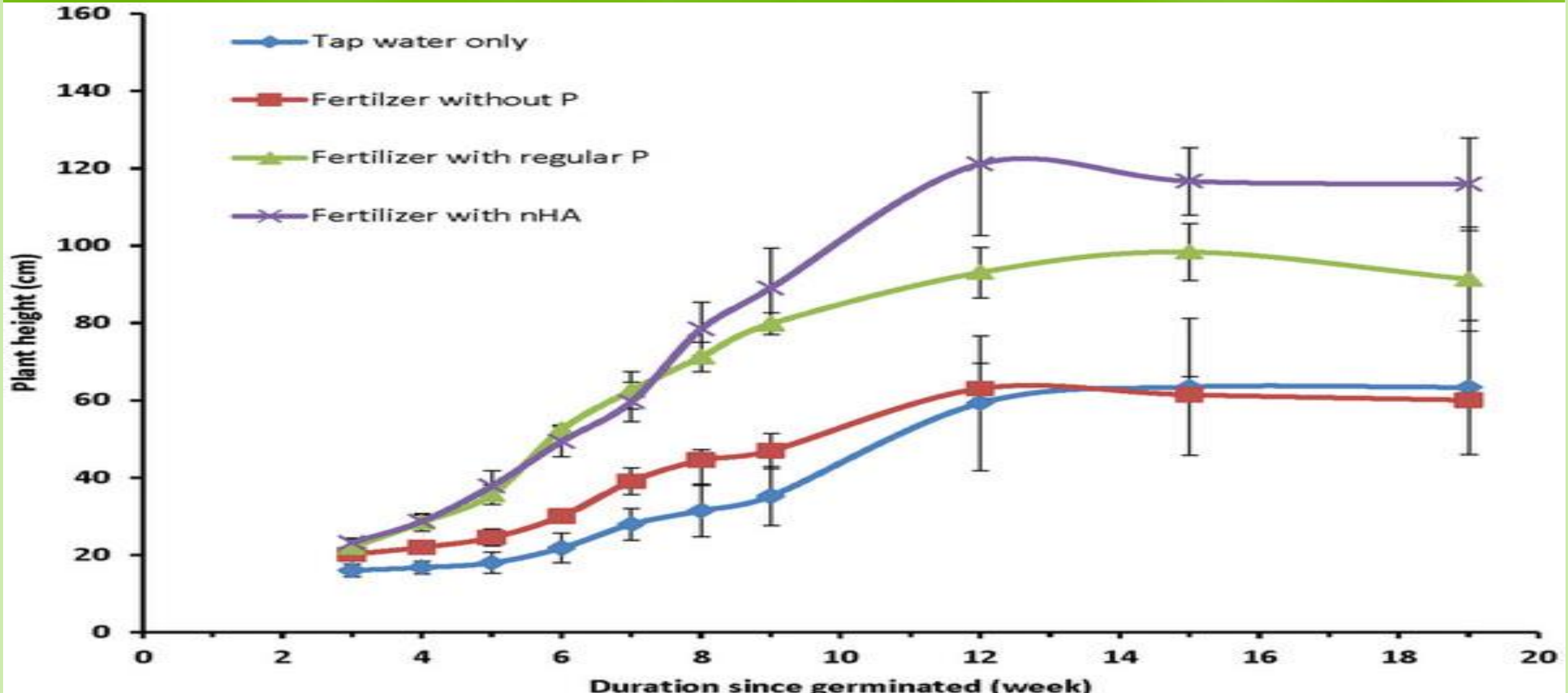
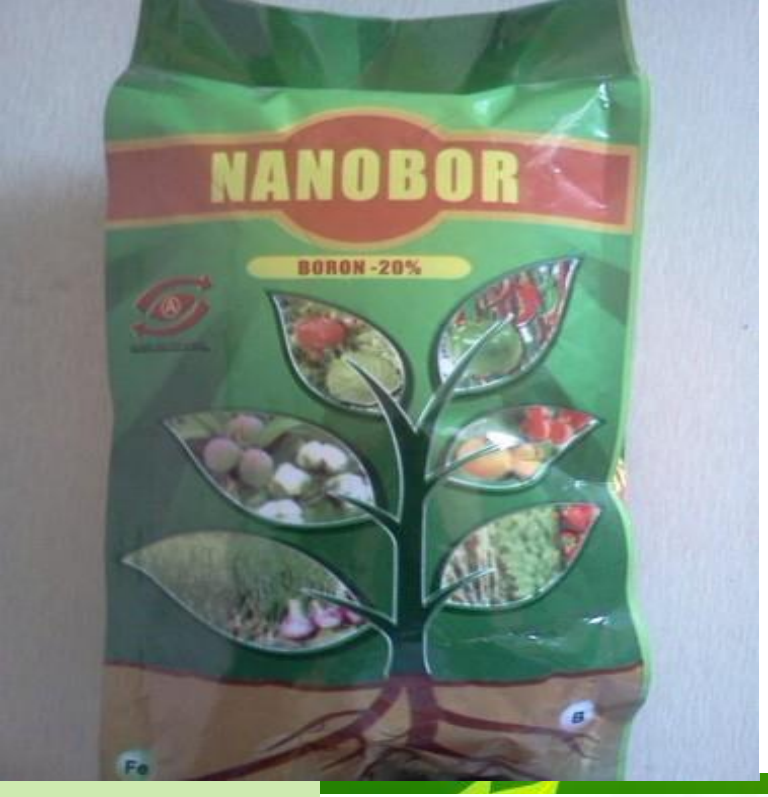

After 65 days
Weight is 1 kg using ordinary fertilizer
Weight is 5.5 kg using nano carbon fertilizer

Growth of soybean plants under different treatments



TYPES OF NANO FERTILIZERS

- *Nano porous Zeolite*
- *Zinc Nano Fertilizer*
- *Nano Herbicide*
- *Nano Pesticide*
- *Carbon Nano tube*
- *Boron Nano fertilizers*


NANOBOR
BORON -20%


florikan
BMP
florikan


NANO ZINC


Uno Fortune Inc.
established 1993
Nano-5
Nano-5
Nano-5
Nano-5
Nano-5
3 IN 1 NATURAL MUCILAGE ORGANIC FERTILIZER®
Since 1994
plant growth, elimination of pests and diseases ,
prevention of pests and diseases

Control Carbon Nanotubes

Nano-Fertilizers for BIOTA-EG Company

		Percentages of Nutrition Elements (%)						
Nano-Fertilizer	**Type**	**N**	**P**	**K**	**Mg**	**Ca**	**Total %**	**Dose**
Vegetative Stage 19 6 6 2	**Nano**	3.8	1.2	1.2	0.4		**6.6**	**Half Dose of Traditional Fertilizers**
	Equivalent	38	12	12	4		**66**	
Flowering Stage 19 6 20 4	**Nano**	3.8	1.2	4	0.8		**9.8**	
	Equivalent	38	12	40	8		**98**	
Fruiting Stage 15 5 30 3	**Nano**	3	1	6	0.6		**10.6**	
	Equivalent	30	10	60	6		**106**	
Rooting Stage 13 40 13 1	**Nano**	2.6	8	2.6	0.2		**13.4**	
	Equivalent	26	80	26	2		**134**	
General fertilizer 20 20 20	**Nano**	4	4	4			**12**	
	Equivalent	40	40	40			**120**	
General fertilizer 19 19 19	**Nano**	3.8	3.8	3.8			**11.4**	
	Equivalent	38	38	38			**114**	

All fertilizers in liquid phase (each one liter equivalent two liter from traditional one)

		Percentages of Nutrition Elements (%)						
Nano-Fertilizer	**Type**	**N**	**P**	**K**	**Mg**	**Ca**	**Total %**	**Dose**
Potassium Nitrate 13 0 46	**Nano**	2.6	0	9.2			**11.8**	**Half Dose of Traditional Fertilizers**
	Equivalent	26	0	92			**118**	
Calcium Nitrate 15.5 0 0 Ca 20%	**Nano**	3.1	0	0		6	**9.1**	
	Equivalent	31	0	0		60	**91**	
Ca & Mg nitrate	**Nano**	3.1	0	0	6	3	**12.1**	
	Equivalent	31	0	0	60	30	**121**	
MAP	**Nano**	2.4	12.2	0			**14.6**	
	Equivalent	24	122	0			**146**	
Urea	**Nano**	9.2	0	0			**9.2**	
	Equivalent	92	0	0			**92**	
Ammonium Nitrate 0 0 50	**Nano**	6.8	0	0			**6.8**	
	Equivalent	68	0	0			**68**	
Potassium Sulphate 0 0 50	**Nano**	0	0	5			**5**	
	Equivalent	0	0	50			**50**	
Potassium Citrate	**Nano**	0	0	7.64			**7.64**	
	Equivalent	0	0	76.4			**76.4**	

All fertilizers in liquid phase (each one liter equivalent two liter from traditional one)

	Percentages of Nutrition Elements (%)										
Nano-Fertilizer	**Type**	**N**	**P**	**K**	**Ca**	**Mg**	**Fe**	**Zn**	**Mn**	**B**	**Si**
Silicate potassium	**Nano**	5		10							6
	Equivalent	50		100							60
Biota Calcium & Boron	**Nano**				6					2	
	Equivalent				60					20	
Rock Phosphate	**Nano**		4		8.8						2.8
	Equivalent		40		88						28
Biota Agro	**Nano**	4.6	0.2	9			1	0.5	0.5		
	Equivalent	46	2	90			10	5	5		

Product	%	Properties	Dose
Biota Copper	**% 8**	- It is used to treat the symptoms of copper deficiency on different crops such as vegetables, fruits, ornamental plants and aromatic and medicinal plants where its nanoparticles fight fungal and bacterial diseases such as: -Fuzzy whiteness. — soybean mold - leaf stains - fiery roll on pears - scabies - early and late seminar on tomatoes and potatoes - flowers in mango - death of the birds — Anthracnose	**Use**: Spraying or injecting into the soil **Dose**: 1cm/L In cases of prevention recommended dose: 2cm/L In case of infection : 3cm/L
Biota Sulfur	**% 8**	- Contains the sulfur element in the nanoscale image, which is used to treat symptoms of sulfur deficiency pal, which is one of the basic nutrients of the plant that helps in metabolism. -Used in the treatment of micro-whiteness and treatment of spiders and acarosates.	**Use:** Spraying or injecting into the soil **Dose**: 1cm/L In cases of prevention recommended dose: 2cm/L In case of infection : 3cm/L
Biota Iron	**% 4**	It treats the symptoms of iron deficiency of all kinds in different soils. It is characterized by containing iron in its nanoscale image and is constant and is not affected by the value of pH for dusting.	**Use:** Spray **Dose:** 0.5cm/ L In cases of Iron deficiency: 1cm/L
Biota Zinc	**% 4**	Supplies the plant with the amount of zinc needed for its growth, which plays a key role in: The synthesis of enzymes created by activation the antioxidants Influencing the functioning of important biochemical processes in plants, which include protein formation, hormone regulation and energy production. Chlorophyll formation activates growth hormones. Help ripening fruits.	Use: Spray Dose: 0.5cm/ L In cases of Zinc deficiency: 1cm/L
Biota Manganese	**% 4**	Supplies the plant with its manganese need to perform vital operations It is characterized by the change in the value of the soil's pH constant, whether acidic or alkaline.	Use: Spray Dose: 0.5cm/ L In cases of manganese deficiency: 1cm/L
Biota free		Biota Free is a bio-zinc nano-product that eliminates all types of nematoda, whether eggs or larvae, and has no toxic effect on the plant and has no residues. Biota Free is characterized by the fact that it induces the roots of infected plants to release new radical whiskers that help the plant absorb and food	Use: Injection into the soil Dose: 5 liters/acre It is recommended to use the last 30 hours of irrigation to keep the product in the root area
Biota T		Used to treat stiffness Keeping in mind that the product works through contact, this is well taken into account when used.	Use: Spray Dose: 5cm/ L
Biota null		For the treatment of microbugs and crustacean insects Keeping in mind that the product works through contact, this is well taken into account when used	Use: Spray Dose: 7cm/ L

Natural Nano oils

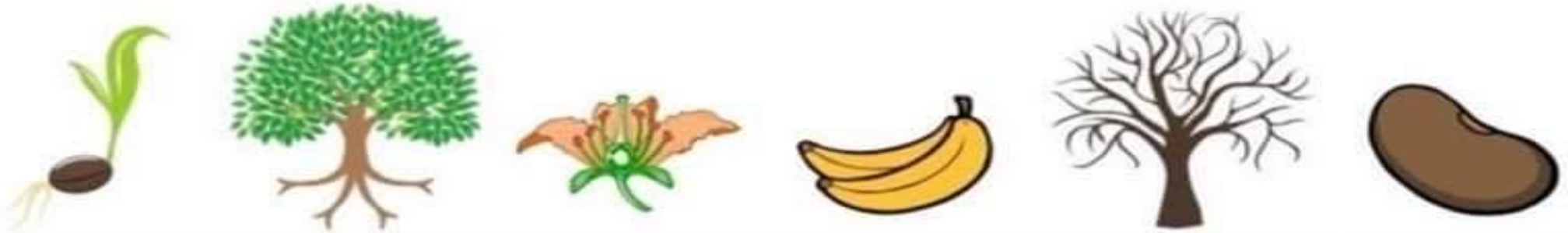
oils	%
Jojoba	10
elneam	10

Material	Leafy ornamentals		Flowering ornamentals
	Ingredients (g/L)		
Part (A)			
Calcium Nitrate	Analysis	26.3	18.4
	Equivalent	264	184
Iron (Fe)	Analysis	0.5	0.5
	Equivalent	5	5
Part (B)			
Potassium Nitrate	Analysis	4.9	6.6
	Equivalent	49	66
MKP	Analysis	7.8	7.8
	Equivalent	78	78
Magnesium sulphate	Analysis	19	18.9
	Equivalent	190	189
Potassium sulphate	Analysis	25.7	25.7
	Equivalent	257	257
Manganese sulphate	Analysis	0.08	0.08
	Equivalent	0.8	0.8
Zn sulphate	Analysis	0.011	0.011
	Equivalent	0.11	0.11
Boric	Analysis	0.039	0.003
	Equivalent	0.39	0.39

Material	Strawberry		
	Ingredients (g/L)		
Part (A)			
Calcium Nitrate	Analysis	6.2	
	Equivalent	62.91	
Iron (Fe)	Analysis	0.5	
	Equivalent	5	
Potassium Nitrate	Analysis	2.21	
	Equivalent	22.15	
MKP	Analysis	3.3	
	Equivalent	33.3	
Magnesium sulphate	Analysis	5	
	Equivalent	50	
Potassium sulphate	Analysis	–	
	Equivalent	-	
Manganese sulphate	Analysis	0.08	
	Equivalent	0.8	
Zn sulphate	Analysis	0.011	
	Equivalent	0.11	
Boric	Analysis	0.039	
	Equivalent	0.39	

Material		Tomato	cucumber
		Ingredients (g/L)	
Part (A)			
Calcium Nitrate	Analysis	14.7	1.15
	Equivalent	147.09	11.5
Iron (Fe)	Analysis	0.5	0.5
	Equivalent	5	5
Part (B)			
Potassium Nitrate	Analysis	5.1	3.46
	Equivalent	51.7	34.6
MKP	Analysis	4.2	3.46
	Equivalent	42.3	34.6
Magnesium sulphate	Analysis	7.8	4.17
	Equivalent	78.4	41.7
Potassium sulphate	Analysis	35.5	25.7
	Equivalent	355	257
Manganese sulphate	Analysis	0.08	0.08
	Equivalent	0.8	0.8
Zn sulphate	Analysis	0.011	0.011
	Equivalent	0.11	0.11
Boric	Analysis	0.039	0.003
	Equivalent	0.39	0.39

تأثير منظمات النمو المختلفة على اطوار النباتات المختلفة و التي تذيد فاعليتها بتحويلها الى مركبات بحجم النانو



	Germination	Growth to Maturity	Flowering	Fruit Development	Abscission	Seed Dormancy
Gibberellin	✓	✓	✓	✓	✗	✗
Auxin	✗	✓	✓	✓	✗	✗
Cytokinins	✗	✓	✓	✓	✗	✗
Ethylene	✗	✗	✓	✓	✓	✗
Abscisic Acid	✗	✗	✗	✗	✓	✓

- *This nano fertilizers and pesticides including normal fertilizers , compound fertilizers , secondary , micro elements single and mixture , organic nano fertilizers and soil less and hydroponic fertilizers.*
- *Nano pesticides nano elements and natural oils to control nematode, insects ,mites , viruses , fungus and bacteria .*
- *The advantage is half cost and more efficient and no pesticides remedies for export.*

Thank You !