Fertilizer, Risk Assessment and Good Practice

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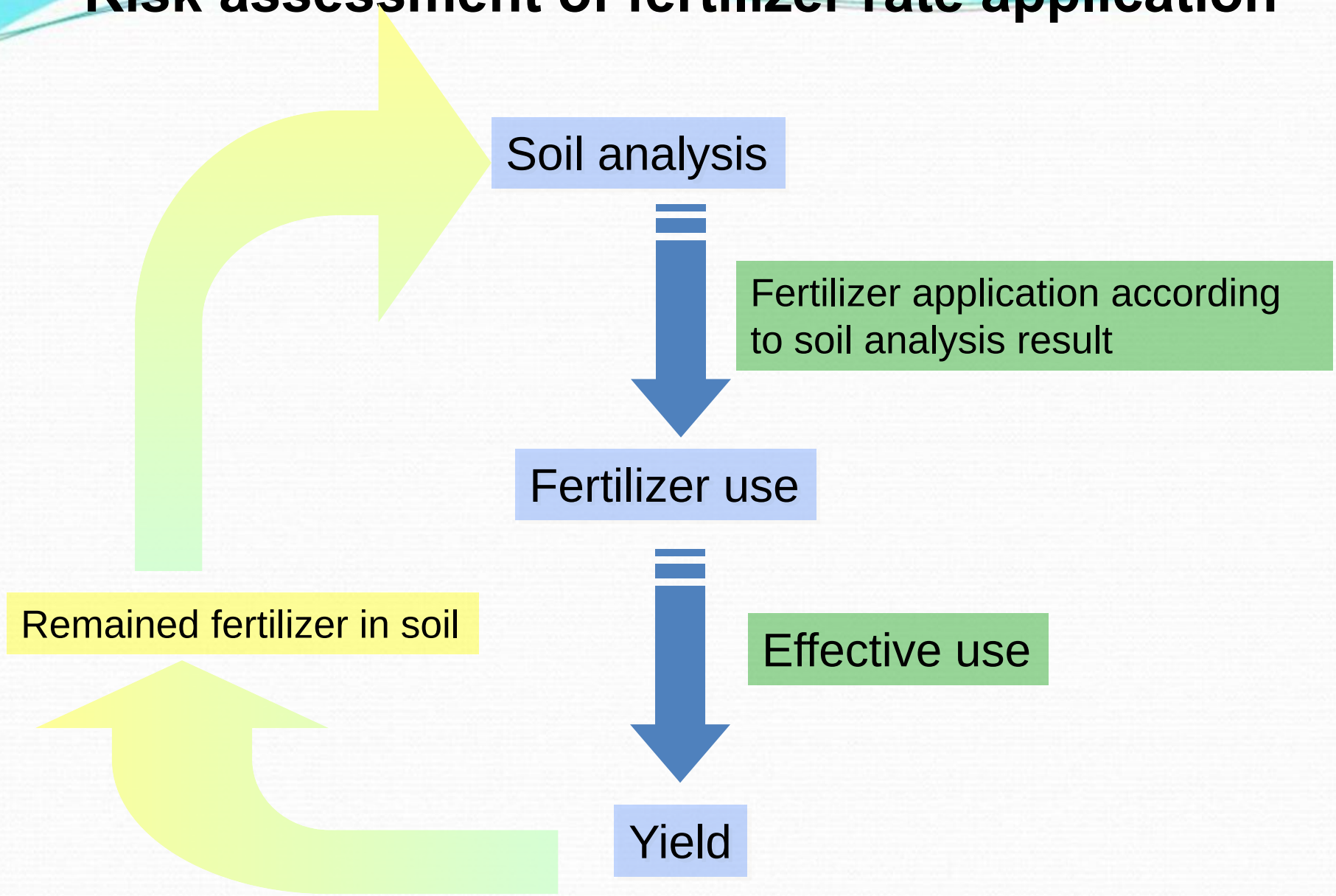
Content

- Soil fertility
- Plant growth essential elements
- Effective application of fertilizer
- Fertilizer quality
- Fertilizer storage
- Risk elimination during storage
- Risk elimination of fertilizer and soil conditioning applications

Fertilizer application for plant requirement and soil analysis

Item	unit
Plant requirement	100
Soil analysis	30
Fertilizer need	70
organic fertilizer	20
inorganic fertilizer	50

Risk assessment of fertilizer rate application

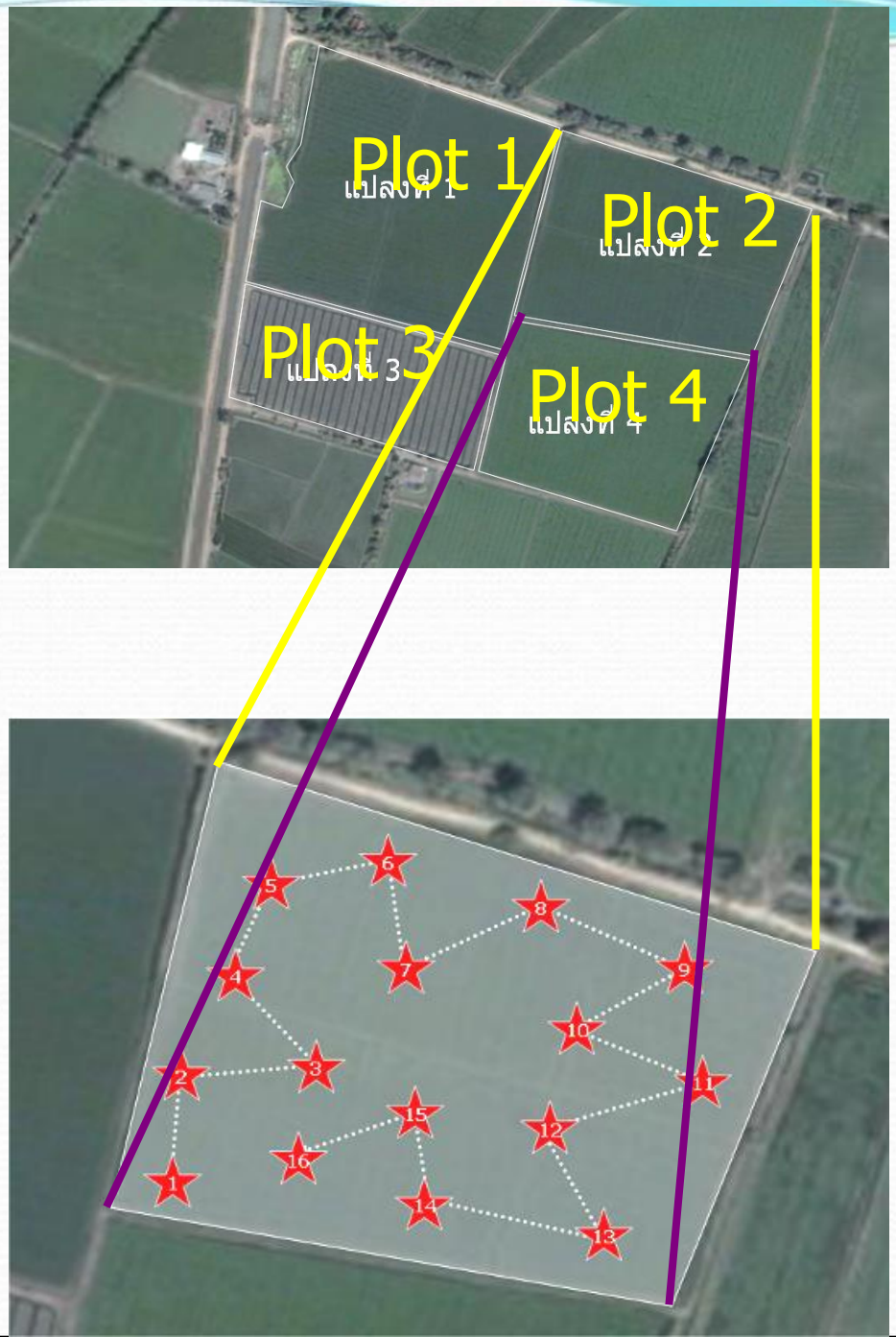


Risk assessment of soil fertility

1. Plant characteristic
2. Fertilizer test
3. Soil analysis
4. Plant analysis

Soil sampling for soil fertility assessment

- Planting soil divided into the sub plot (<20 rai)
- Soil sampling by random
- Ten spot soil sampling of each sub plot


Plot 1
แปลงที่ 1
Plot 2
แปลงที่ 2
Plot 3
แปลงที่ 3
Plot 4
แปลงที่ 4
1
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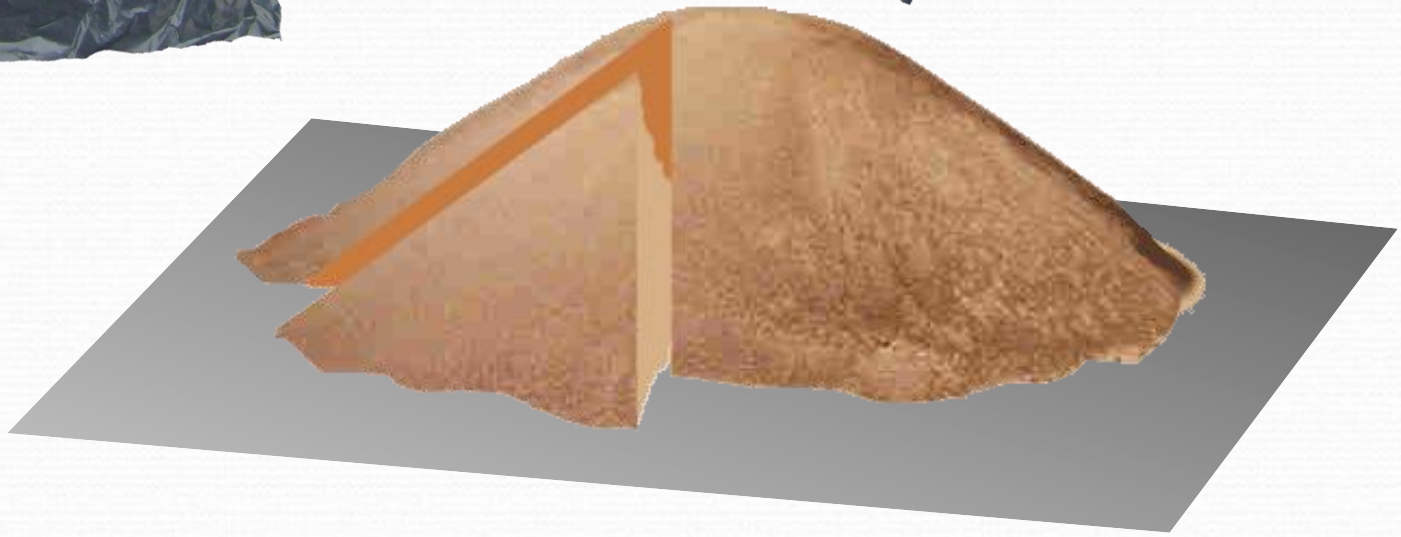
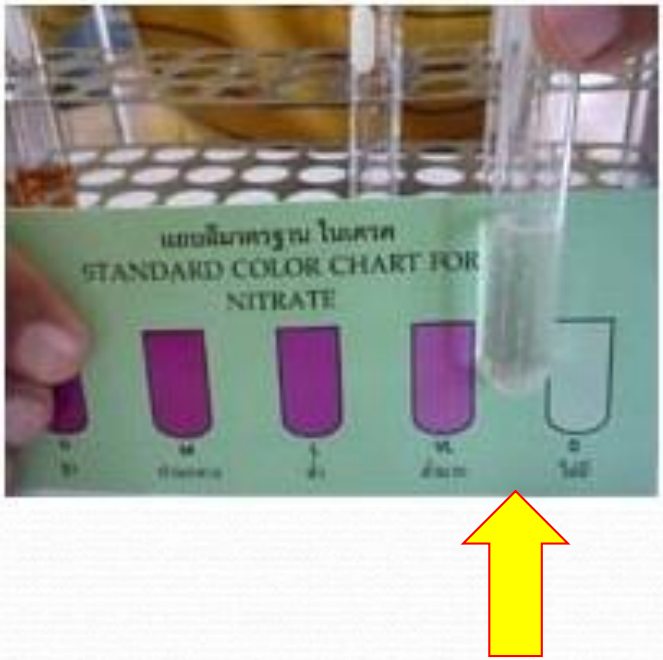


N P K assessment

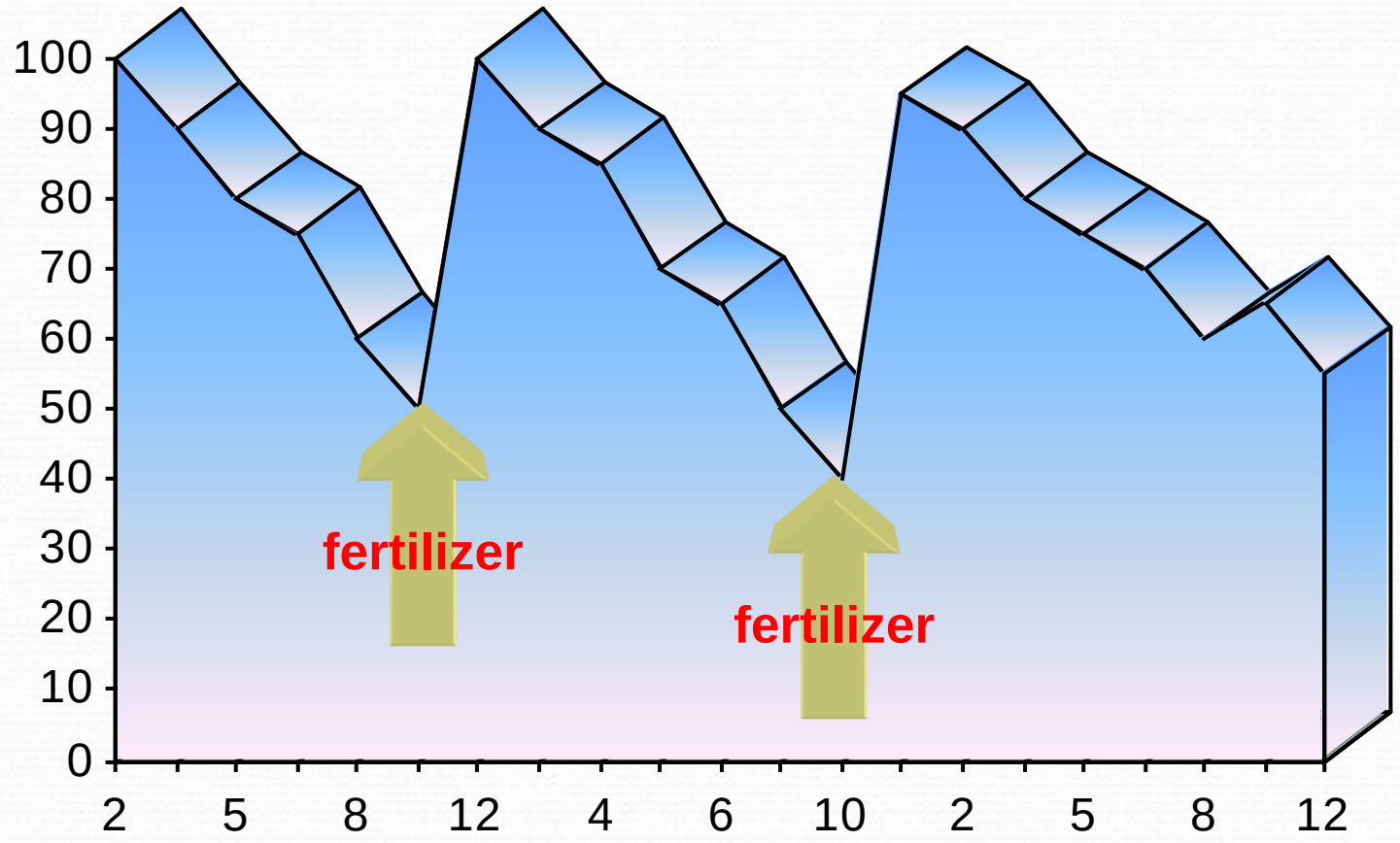
- Department of Soil Science's soil test kit for N P K

Quick test of soil test kit



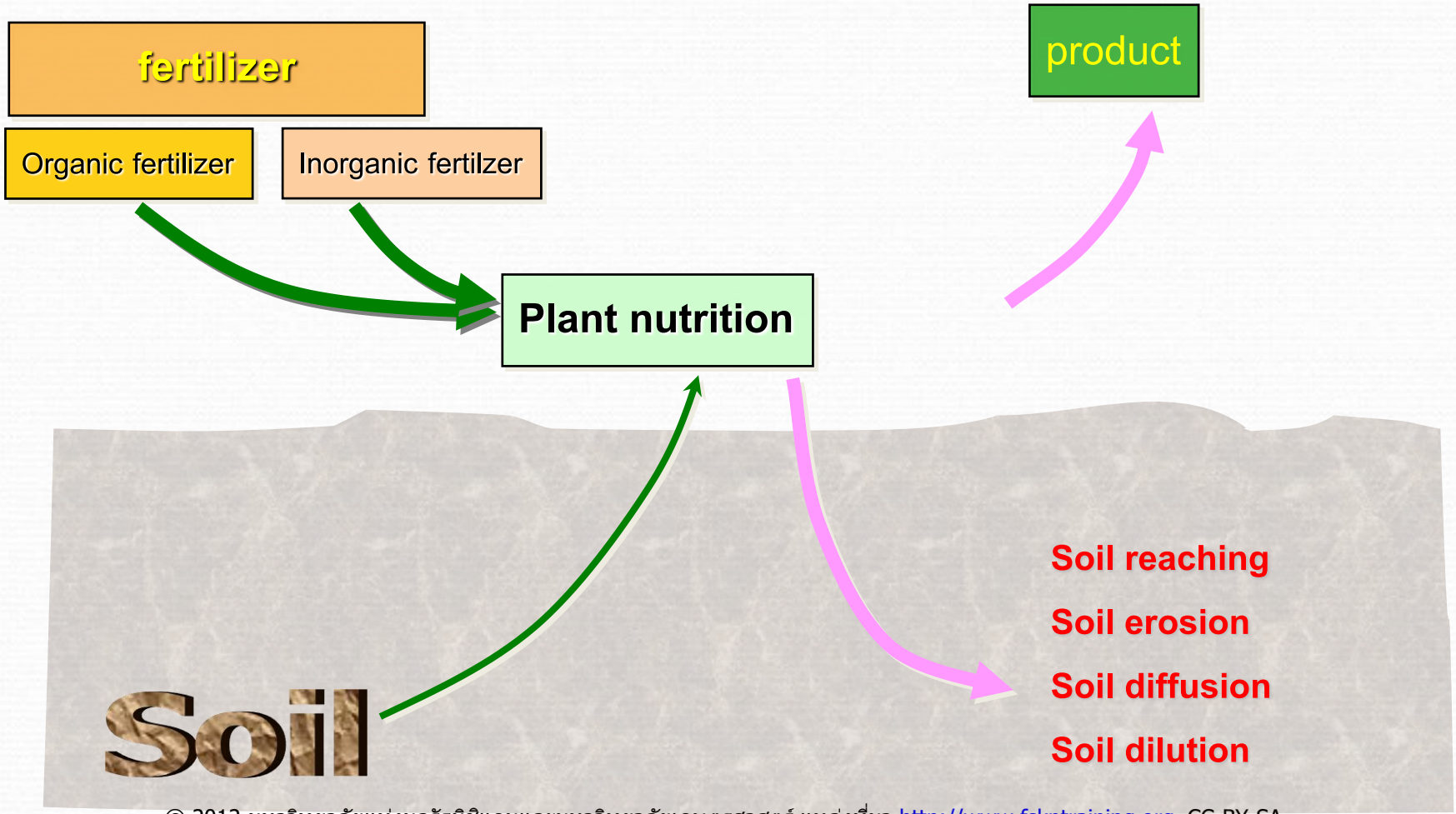
Principle of soil application

- Fertilizer application for maintain and improve for soil fertility



Principle of soil application

- Nutrition balance in harvesting product



Plant nutrition requirement

- Vegetative growth, plant need nitrogen (N)
- Reproductive growth, plant require phosphorus (P)
  flower development, by activated flower bud that influence of plant hormone
- Fruit and seed development, nutrition accumulated in fruit and seed
  particular the carbohydrate: starch and sugar by potassium element (K)

Some chemical fertilizer

Common name	Fertilizer formula
Ammonium sulphate	21-0-0
urea	46-0-0
Rock phosphate	0-3-0
dap	18-46-0
Triple super phosphate	0-46-0
Potassium chloride	0-0-60
Potassium sulphate	0-0-50
Other formula	13-13-21 15-15-15 16-16-16 25-7-7 12-24-12 14-14-21 8-16-24 14-9-20 13-0-46

การใช้ปุ๋ยอย่างมีประสิทธิภาพ

- Effective (%) = $\frac{\text{revenue} \times 100}{\text{investment}}$
- Fertilizer application 100 กก.
- Plant absorption 40 กก.
- Effectiveness = $\frac{40 \times 100}{100}$

  = 40 %

Increase the effective application

1. Preventing soil nutrition reaching with soil covering and watering
2. Fertilizer apply method change in more effectiveness method e.g. fertigation method
3. Divided more frequency application nitrogen fertilizer
4. Change the fertilizer type e.g. slow release fertilizer, coating fertilizer surface but it’s high price
5. Mixed organic and chemical fertilizers

Appropriate application method

- Select fertilizer type

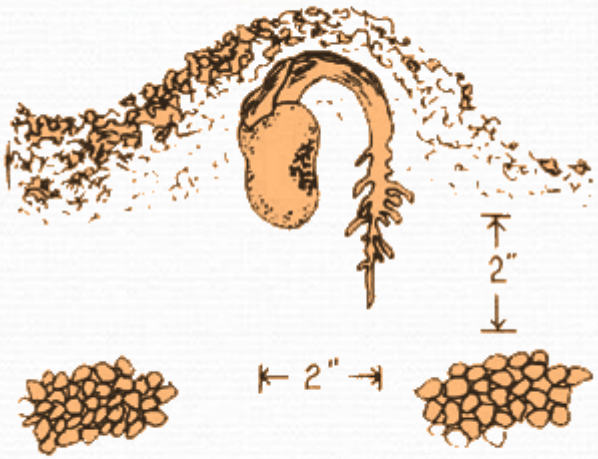
  organic fertilizer and/or chemical fertilizer
- Application rate

  depend on fertilizer concentration
- Application method (effective method)
- Application timing fit for the plant growth and requirement (early application but be careful the reaching)

Fertilizer application method

- Soil application
  - Broadcast
  - Row apply
  - Hole method
- Spraying method
- Fertigation

Soil application



- Main purpose for nutrition application
- Higher rate using
- Loose in the soil by nutrition fixing or diffusion
- Low effective

Spraying method

- Must be used the low concentration
- May be affected to leaf bright
- Not suitable for the high volume required of nutrient element
- High cost for spraying method but it may be mixed with plant protection product
- Quick absorption by plant
- Suitable for minor element deficiency quickly solution method

Fertigation system

- No labor cost
- High effective application method
- Must be used the soluble fertilizer
- Must be used the quality water (filtrated)
- May be blocked the nozzle

Fertilizer quality

- Fertilizer formula complied to plant requirement
- True to type / completed fertilizer element
- Stable of fertilizer
- Suitable physical property

  not forming clod and uniformity particle size

Quantity of certified nutrient element

- Fertilizer formula
- 16-20-0
- Meaning
- Total nitrogen 16 %
- Available phosphorus 20 %
- Soluble potassium 0 %

Fertilizer cost per element

- Fertilizer cost per element = $\frac{\text{fertilizer cost 100 kg.}}{\text{\% of element}}$

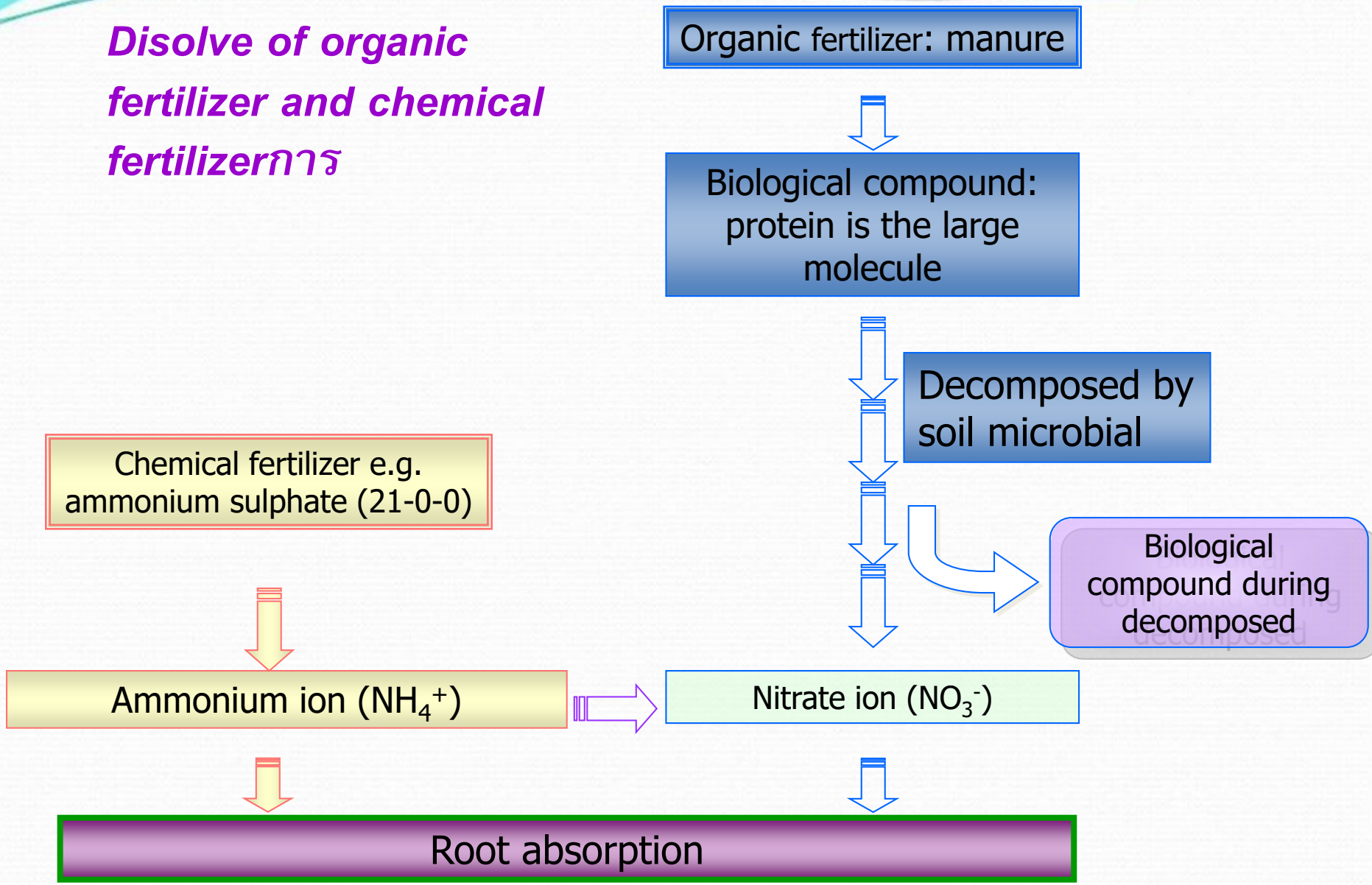
example

urea	cost per ton	9200 baht
cost	9200 / 10	= 920 บาท / 100 kg.
nitrogen		= 46 %
Cost per nitrogen		= 920 / 46 = 20 baht

Fertilizer cost

Cow manure	urea
1 % Nitrogen	46 % Nitrogen
Cow manure 100 กก. Nitrogen 1 kg.	Urea 100 กก. Nitrogen 46 kg.
Cow manure 1000 กก. Nitrogen 10 kg.	Urea 1000 กก. Nitrogen 460 kg.
Cow manure 1 ton Nitrogen 10 kg.	Urea 1 ton Nitrogen 460 kg.
Cow manure 1 ton cost 4000 baht	Urea 1 ton cost 9200 baht
Cow manure 1 kg. cost 4000 / 10 baht	Nitrogen 1 kg. cost 9200/460 baht
= 400 baht	= 20 baht

Disolve of organic fertilizer and chemical fertilizerการ



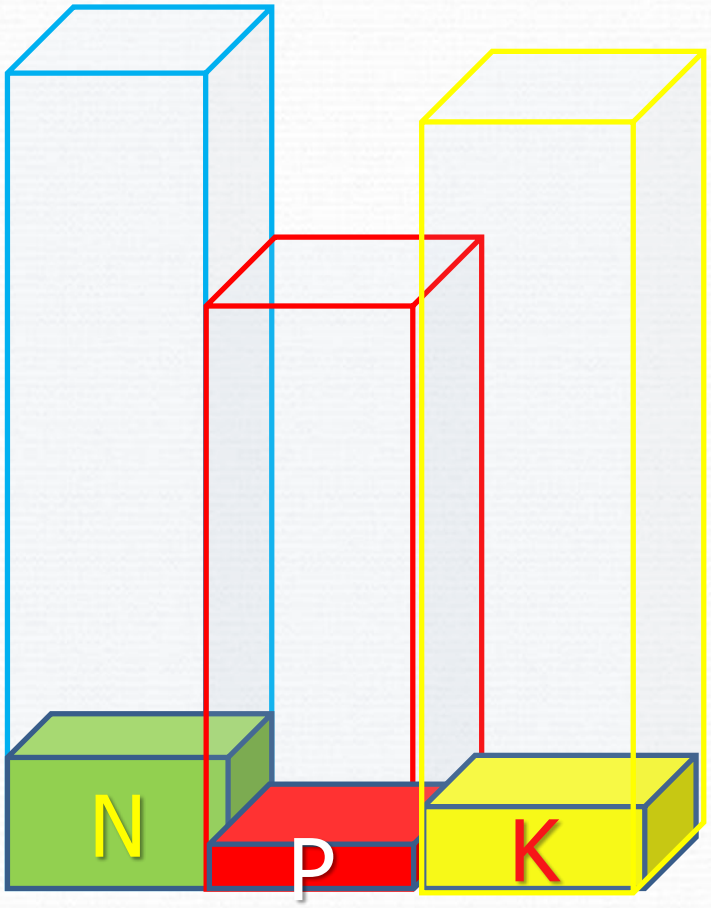
Inorganic fertilizer

- Pellet
- แบบไม่เป็นเนื้อเดียวกัน

  / mixture

  / bulk blending

Additional element in bio-chemical fertilier



ความต้องการธาตุอาหารพืช

ปุ๋ยเคมี

ปุ๋ยอินทรีย์

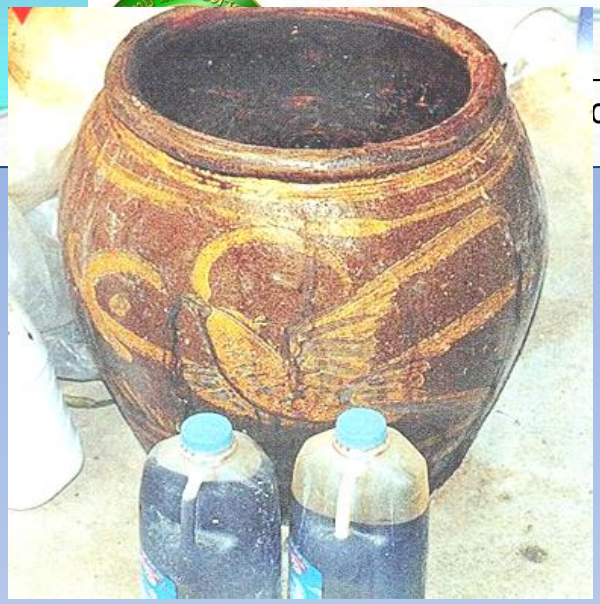
Organic fertilizer

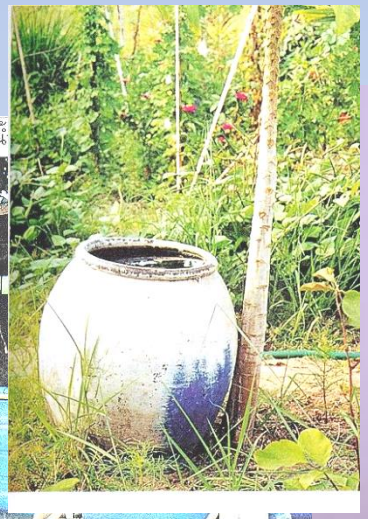
- Manure
- Compost
- Green manure
- Bio-fertilizer

Soil improvement by organic fertilizer

- Organic fertilizer
- Physical soil property improvement
- Additional minor element, mineral supplement into the soil

Liquid fertilizer bio-fertilizer



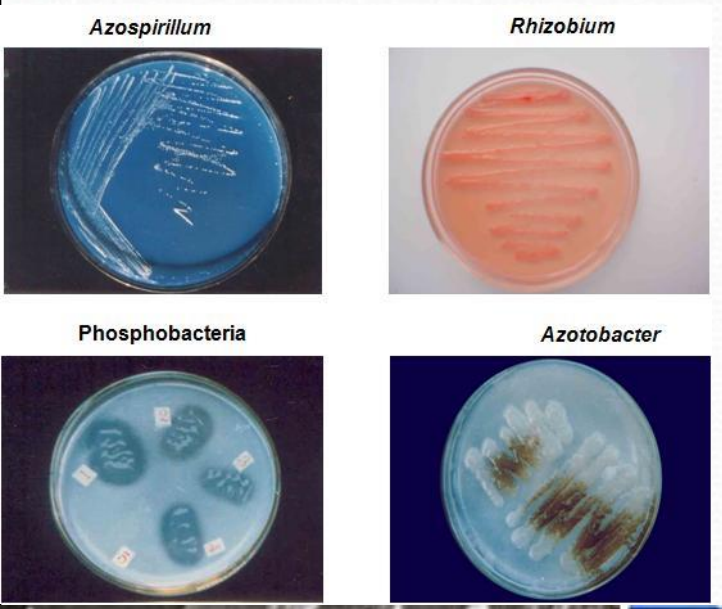


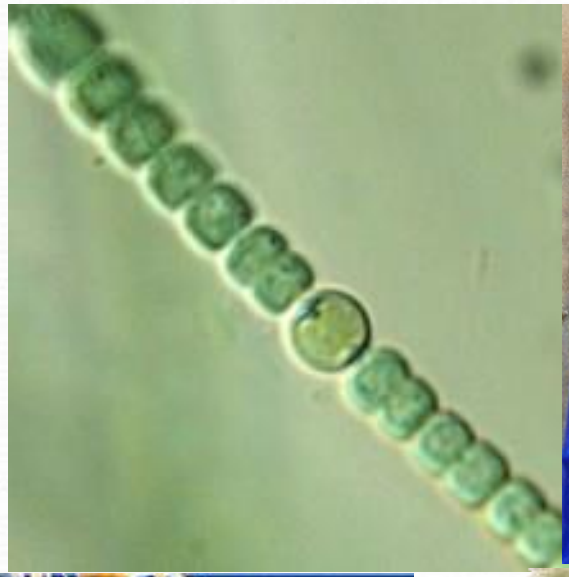
Complete manure

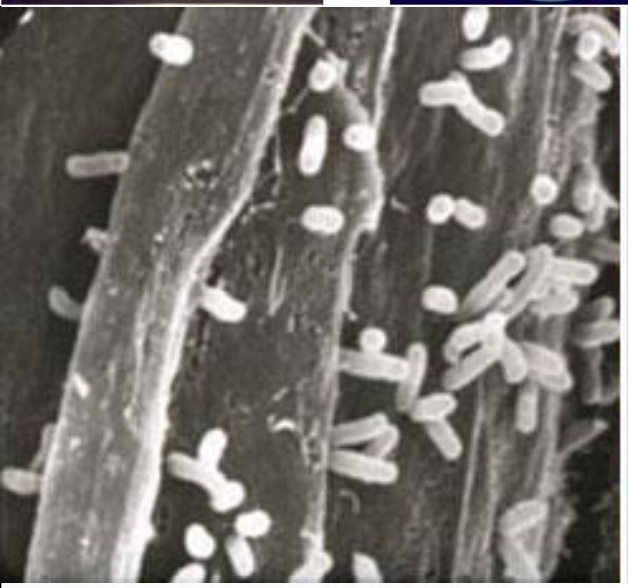
Organic Residual Reclamation

Organic Residual Reclamation
http://compost.tamu.edu/demos/palopinto/compost.jpg

Bio-fertilizer







Fertilizer storage

Fertilizer storage risk elimate

Roof

Separate from product

Away from water source

Separate from plant protection product

Cleaned floor

Palette board prevented the moist

Clear separated location

Clear separated location

Hazard from contamination

- Chemical
- Biological
- Physical

Fertlizer risk assessment

- Soil analysis
- Fertilizer property analysis
- Information traceability of fertilizer
- Fertilizer contamination in soil and product

Chemical and biological contamination

- Nitrate (NO_3^-) and nitrite (NO_2^-) content in vegetable
- Methemoglobinemia
- N-nitroso compound

Fertilizer registration

- Inorganic fertilizer must be registration except the standard fertilizer
- Inorganic Fertilizer Division

  Agricultural Regulatory Office

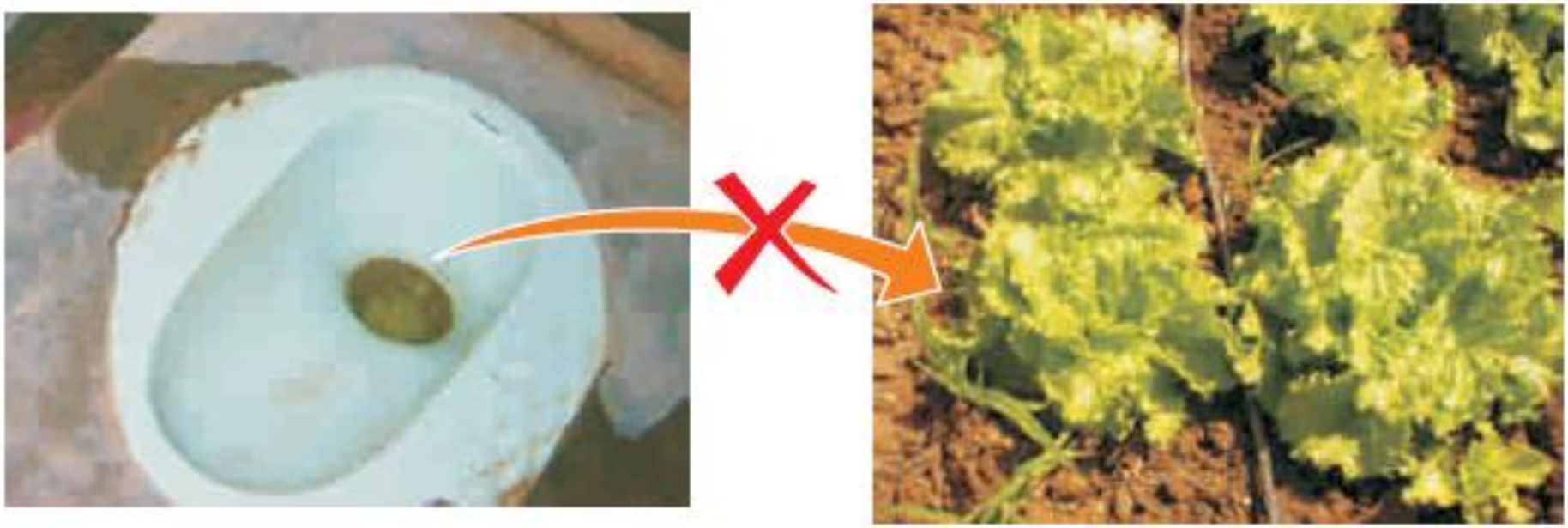
  Department of Agriculture
- Registration document with คำขอขึ้นทะเบียน พร้อมเอกสารประกอบ ได้แก่ ผลการวิเคราะห์ปุ๋ย ผู้ผลิต เครื่องหมายการค้า และสถานที่ผลิต เป็นต้น
- เลขทะเบียนปุ๋ย ปรากฏที่กระสอบปุ๋ย
- สามารถใช้ในการทวนสอบได้

Registration number on the package label

Standard fertilizer no registration requirement

Not use watse water for vegetable production

ไม่ใช่ของเสียจากส้วม เป็นปุ๋ยสำหรับผักรับประทานสด



Sum tank

Fertilizer or soil conditioning application risk elimate

- Mulching with plastic sheet or using basement material to prevent contamination during harvesting period
- Pre-harvest interval period after organic fertilizer applied
- Buffer zone: irrigated canal, protecting facility in order to prevent and elimate risk contamination

การขออนุญาตเพื่อเผยแพร่ซ้ำ

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