

Designing pot experiment (an example)

Radish is grown on plowed layer and sublayer soils of volcanic ash field. Different amounts of fertilizers are applied and the growth of radish is compared between the treatments.

In this experiment, problems of subsoil and its improving method is studied.

Used crop: Radish. Because radish grows fast. Seeds are small and reflect the nutrition state of soil. Crops with small seeds such as Japanese mustard spinach: Komatsuna (*Brassica rapa* var. *perviridis*) are also often used.

Size of pot: Wagner pot of 1/5000 a.

Number of seeds: 15 seeds/ pot

Used soil: Subsoil (30–50 cm) and plowed layer soil (0–20 cm) of experiment field (volcanic ash soil).

Repetition: 2 / each treatment.

Number of pots: 20. 4 for plowed soil, 16 for subsoil.

Preparation and filling of pot:

Drain apparatus is placed on the bottom of pot.

Pumice granules are filled to 5cm depth.

Then, test soils passed through 2 mm sieve (1.5 kg) are filled in the pot. Calculated amount of fertilizer is mixed with the soil.

Sowing the seed:

In 5 spots on the soil surface, holes with 1cm depth are made with finger. Three seeds are placed in each hole, and seeds are covered with soil.

Seedlings are reduced to one per hole, after true leaves have grown big enough.

Fertilizer design:

For sublayer soil:

- 1) No fertilizer, 2) No nitrogen, 3) No phosphate, 4) No potassium,
- 5) Standard NPK, 6) NPK + Lime, 7) NPK + compost, 8) Compost only.

For plowed layer soil:

- 9) No fertilizer, 10) Standard NPK.

Standard fertilizer rate: N 5kg, P₂O₅ 8kg, K₂O 8kg /10a

Fertilizer application rate (ingredient kg/10 a).

For 7), amounts of ingredients in the compost are subtracted.

Sublayer soil	N	P ₂ O ₅	K ₂ O	Lime or compost
1) No fertilizer	0	0	0	0
2) No nitrogen	0	8	8	0
3) No phosphate	5	0	8	0
4) No potassium	5	8	0	0
5) Standard NPK	5	8	8	0
6) NPK + Lime	5	8	8	100 (lime)
7) NPK + compost	3(2)	1(7)	3(5)	1000 (comp.)
8) Compost	(2)	(7)	(5)	1000 (comp.)

Amounts of constituents in compost are shown in ().

Plowed layer soil	N	P ₂ O ₅	K ₂ O	Lime or compost
9) No fertilizer	0	0	0	0
10) Standard NPK	5	8	8	0

Doses /10a:

Ammonium sulfate: N 21 % N 5kg = Ammonium sulfate 23.8kg

Superphosphate: P₂O₅ 17 % P₂O₅ 8kg = Superphosphate 47.0 kg

Potassium sulfate: K₂O 50 % K₂O 8 kg = Potassium sulfate 16 kg

Cow feces compost: 1000 kg/10a (equivalent to N 2 kg, P₂O₅ 7 kg, K₂O 5 kg)

Treatments for plowed layer soils are decreased to decrease the size of experiment for convenience.

Ideally, the same treatments should be prepared both for subsoil and plowed layer soil.

Repetition of experiment is two, but more repetition is better, if possible.

Dose of each fertilizer (kg /10 a)

Sublayer soil	Ammonium sulfate	Superphosphate	Potassium sulfate	Lime or compost
1) No fertilizer	0	0	0	0
2) No nitrogen	0	47.0	16	0
3) No phosphate	23.8	0	16	0
4) No potassium	23.8	47.0	0	0
5) Standard NPK	23.8	47.0	16	0
6) NPK + Lime	23.8	47.0	16	100 (lime)
7) NPK + compost	14.3	5.88	6	1000 (comp.)
8) Compost	0	0	0	1000 (comp.)

Plowed layer soil	Ammonium sulfate	Superphosphate	Potassium sulfate	Lime or compost
9) No fertilizer	0	0	0	0
10) Standard NPK	23.8	47.0	16	0

Dose of each fertilizer (g per 1/5000 a).

1/50000 of the above table.

Sublayer soil	Ammonium sulfate	Superphosphate	Potassium sulfate	Lime or compost
1) No fertilizer	0	0	0	0
2) No nitrogen	0	0.941	0.32	0
3) No phosphate	0.476	0	0.32	0
4) No potassium	0.476	0.941	0	0
5) Standard NPK	0.476	0.941	0.32	0
6) NPK + Lime	0.476	0.941	0.32	2.0 (lime)
7) NPK + compost	0.286	0.117	0.12	20 (comp.)
8) Compost	0	0	0	20 (comp.)

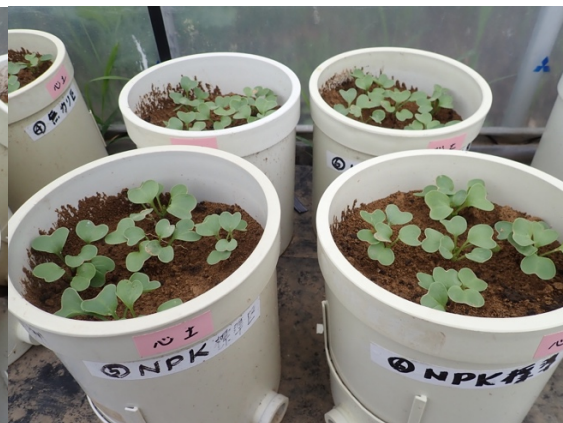
Plowed layer soil	Ammonium sulfate	Superphosphate	Potassium sulfate	Lime or compost
9) No fertilizer	0	0	0	0
10) Standard NPK	0.476	0.941	0.32	0

Photos of pot experiment.

The day of sowing the seed: June 4.



June 9



June 17



June 21



June 26



July 8



July 9