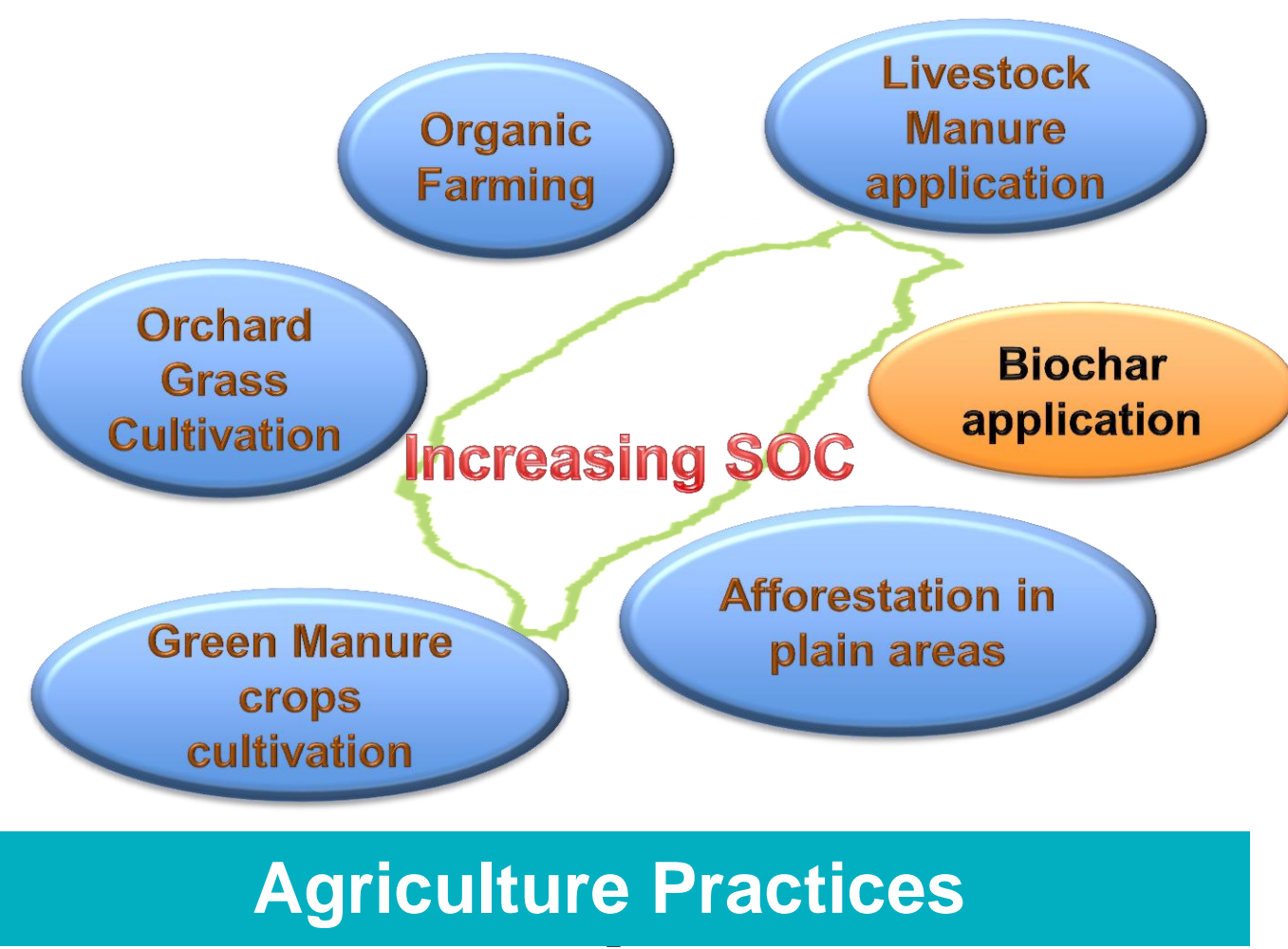




Application of biochar to increase soil carbon sequestration in Taiwan



Soil carbon sequestration rate of some agriculture practices has been estimated in Taiwan. Application of biochar on farmland has the highest soil carbon sequestration among some practices.

□ Potential SOC sequestration in Taiwan

- The content of SOC in Taiwan is about 237 million Mg in 0-100cm depth.

Table 1. Taiwan's potential SOC sequestration in farmland by different agriculture practices.

| Practices | Increasing SOC in 25-yr (%) (0-30cm depth) | Area (10 ³ ha) | SOC (10 ³ Mg) |
|---|--|---------------------------|--------------------------|
| Manure Reuse | Swine | 0.2 | 480 |
| | Poultry | 0.4 | 800 |
| | Cattle | 0.2 | 60 |
| Green Manure | 0.1 | 400 | 800 |
| Organic Farming | 0.4 | 40 | 320 |
| Biochar | 0.8 | 300 | 4,800 |
| Orchard Grass Cultivation | 0.5 | 180 | 1,800 |
| Afforestation in plain areas | 0.4 | 18 | 144 |
| Total = 368 Mg/yr | | | |
| 4.8 % of Agro-SOC ; 1.6 % of (Agro+Forest)-SOC | | | |

□ Biochar application

-Assessment of carbon sequestration-

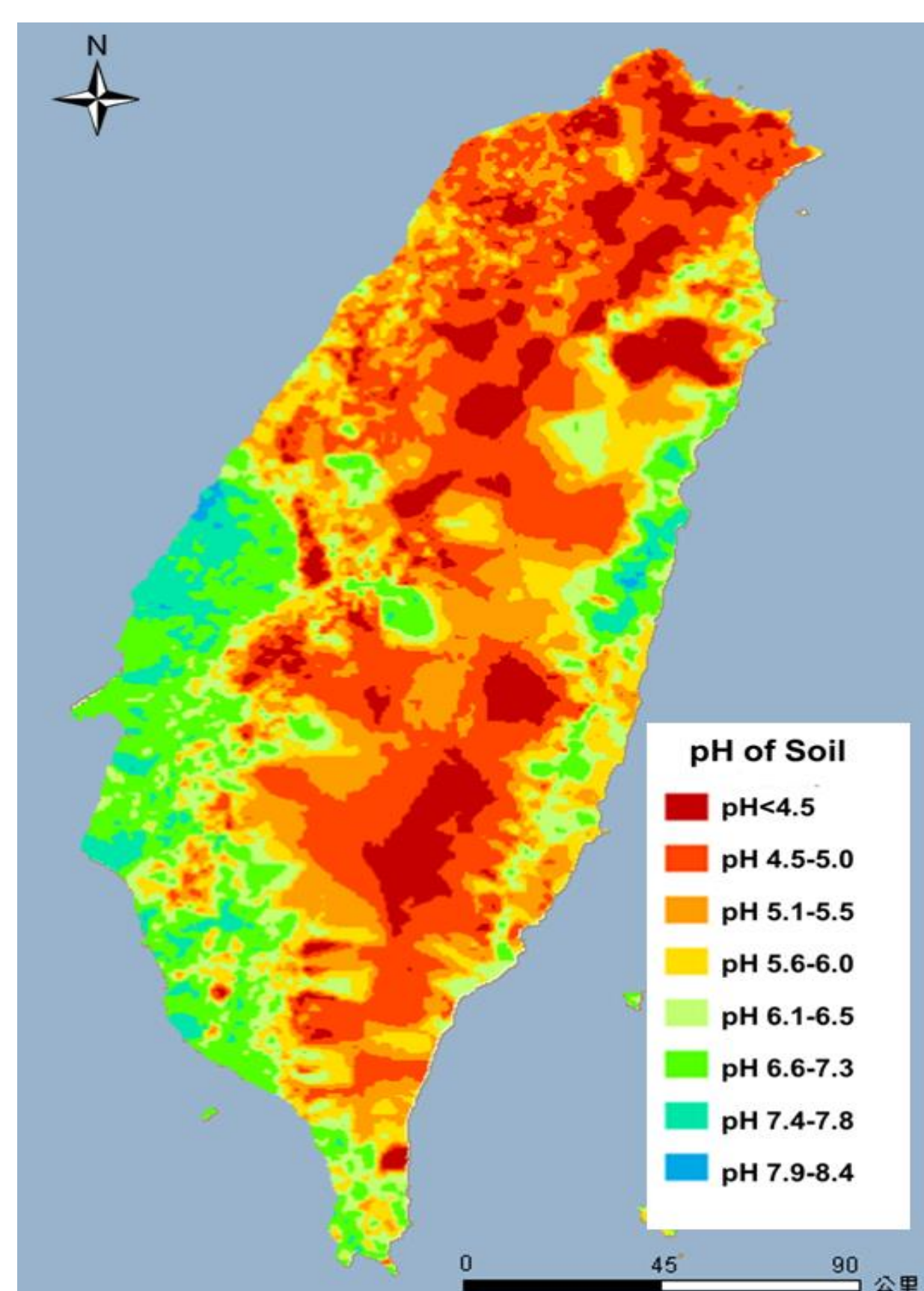


Fig.1 Strong acid soil in Taiwan.

- There are about 300,000 ha strong acid soil (pH<5.5) in Taiwan.
- It tends to be beneficial on production by 2 % biochar application on acid soils.
- The total amount of biochar application will be need about 12 million Mg.

□ Soil carbon sequestration by biochar application

-Soil carbon mineralization incubation-

- Biochars of different feedstock (*Bambusa blumeana*(A), Citrus pruning branches(B), Rice husk(C)) and pyrolysis temperature (400°C, 500°C, 600°C) have been added to two representative soils in Taiwan.

-Pc-soil (acidity laterite)

-Ec-soil (slate calcareous older alluvial soils)

Table 2. Soil properties.

| Characteristics | Pc-soil | Eh-soil |
|--------------------------|----------|-----------|
| pH | 6.1/5.0* | 7.5/7.2* |
| EC (dS m ⁻¹) | 0.45** | 2.21** |
| Sand (%) | 11 | 24 |
| Silt (%) | 30 | 36 |
| Clay (%) | 59 | 39 |
| Soil Texture | Clay | Clay loam |

* Soil pH was determined in soil-to-deionized water ratio of 1:1 (g mL⁻¹) and in soil-to-1N KCl ratio of 1:1 (g mL⁻¹)

** saturated soil paste

- Biochar addition has positive effect of reducing soil carbon mineralization and soil carbon sequestration in Eh-soil. Especially adding the biochar with pyrolysis temperature of 500°C and 600°C.

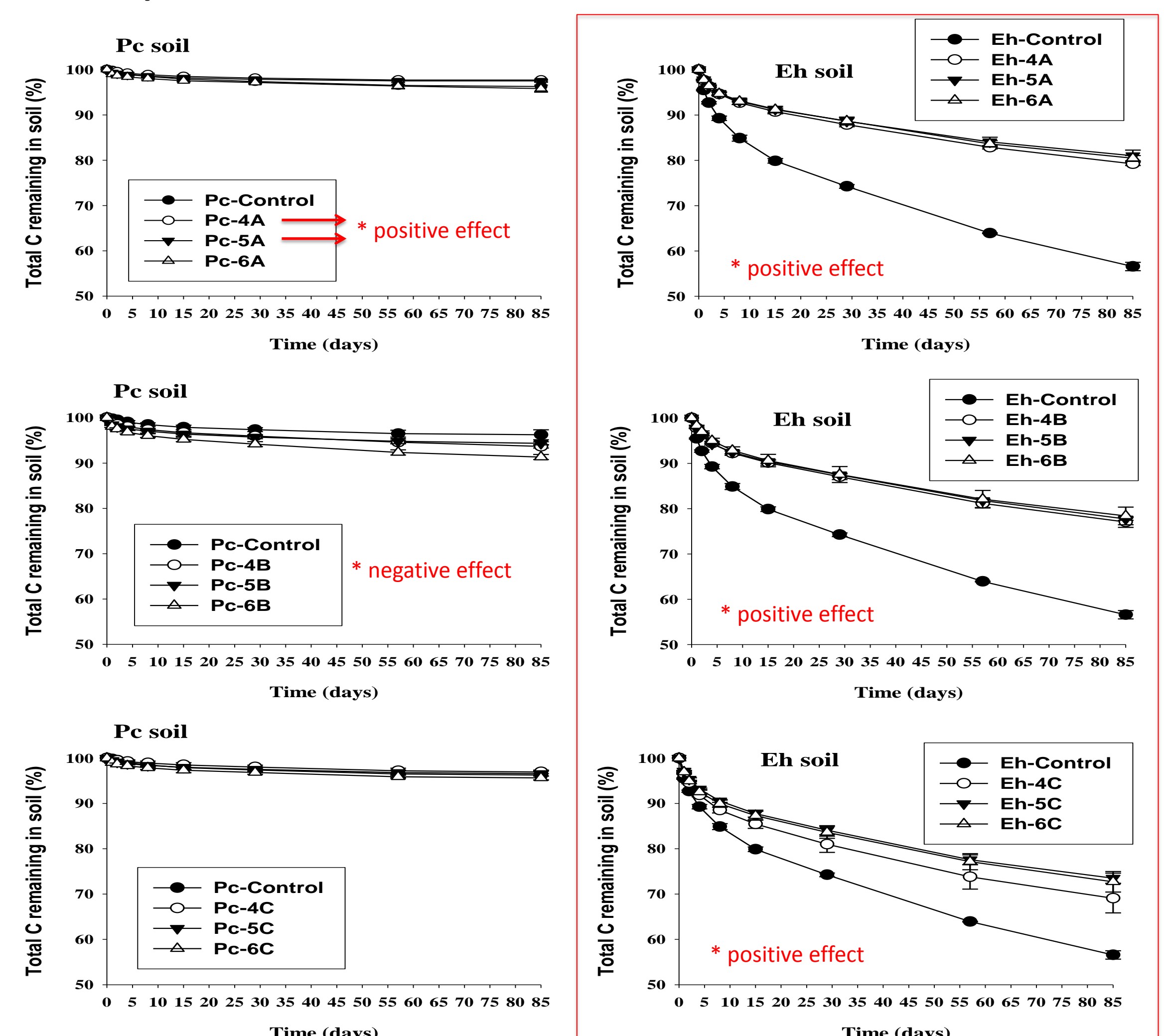


Fig.2 Total carbon remaining in soil

Contact

Coordination Author:

Dr. Chiling Chen

Taiwan Agricultural Research Institution

(TARI), Taiwan R.O.C.

chiling@tari.gov.tw

+886-4-2331-7407

□ Conclusion

- The application of biochar on 300,000 ha strong acid soil, total soil carbon sequestration can increase about **4.8 million Mg**.
- Which can increase the soil carbon sequestration rate of **0.8 % per year** of Taiwan's SOC.