EM 25

Using vermicompost and organic amendment to cultivate salt tolerant crops in high salt-affected soil

Nattakit PETMUENWAI[a], **Chuleemas BOONTHAI IWAI**[ab*] **and Takashi KUMEc**

aDepartment of Soil Sciences and Environment, Faculty of Agriculture, Khon Kaen University, Thailand
bIntegrated Land and Water Resource Management Research and Development Center in Northeast Thailand, Khon Kaen University, Thailand
*cEhime University, Japan *Corresponding email: chuleemas1@gmail.com*

Abstract:
Salt-affected soil are widely distributed thought the world. In the Northeast of Thailand, an area of 17.81 million hectares of the region faces this problem. The soil in the Northeast has a low fertility rate due to sand soil texture in the most part of the area. salt tolerant crops have been introduced for remediation of salt-affected area. However, for severely salt-affected soils, salt tolerant crops may be not cultivated. Therefore, the objective of this research was to study the effect of vermicompost and rice husk ash amendment on cultivation of salt tolerant crops (Sesbania rostrate) in high salt-affected soil. The experiment plan was randomized complete block design with 5 treatments and 4 replications; T1. Saline soil (Control), T2. Saline soil + Vermicompost 25:75, T3. Saline soil + rich husk ash 25:75, T4. Saline soil + Coconut coir 25:75 and T5. Saline soil + Vermicompost + rich husk ash +Coconut coir 25:25:25:25. The results found that Sesbania rostrate could growth in all treatment with saline soil 25%. The highest growth rate of salt tolerant crops were found in T5 with Vermicompost + rich husk ash +Coconut coir fiber and followed by T2 with vermicompost treatment and T3 and T4 after 10 weeks with 97 cm, 85.33 cm, 33 cm and 0 cm respectively. Salt tolerant crops could not survive in T1 saline soil. Vermicompost and organic amendments could increase soil nutrients and reduce electrical conductivity (EC). The results from this study would be useful knowledge to help increasing farmers' income by cultivating salt tolerant crops in severe salt-affected soil.
Keyword: saline, vermicompost, organic amendment, salt tolerant crops

INTRODUCTION

About 17% of land is salt-affected in Northeast Thailand (LDD, 1991) and origin of the salt is rock salt that called Mahasarakham

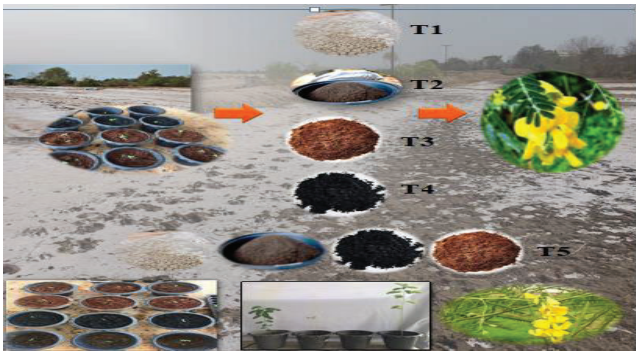
Paddy fields belong to Northeast Thailand are approximately 607 ha and it account for 58 % of paddy fields in Thailand. However, productivity of crops is low due to soil degradation and salinization of irrigation water result from soil-affected. (Kimura et al.,1990)


Salinity negatively impacts plant growth and delays development, thus decreasing crop production. Whereas engineer-ing practices to ameliorate saline soil are being developed, there is also an interest in identifying and cultivating stress resistant plants, which have increased resistance to soil salinity. **Stress-resistant plants** can **be used as medicine, food, or wood**. (Li et al., 2016)

The objective of this research was to study the effect of vermicompost and some organic amendment such as rice husk ash and coconut coir on cultivation of salt tolerant crops (*Sesbania rostrate*) in high salt-affected soil.

Experimental Treatments

The experiment plan was randomized complete block design with 5 treatments and 4 replications; T1. Saline soil (Control), T2. Saline soil + Vermicompost 25:75, T3. Saline soil + Coconut coir 25:75, T4. Saline soil +rich husk ash 25:75 and T5. Saline soil + Vermicompost + rich husk ash +Coconut coir 25:25:25:25.



RESULTS AND DISCUSSION

Figure 1 The electric conductivity in sesbania production in high salt-affected soil under greenhouse conditions.

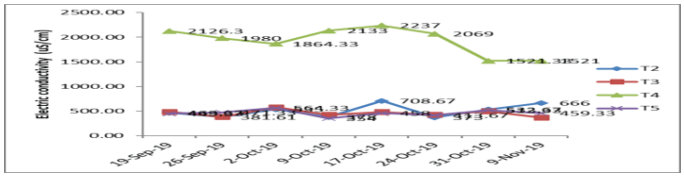


Figure 2 The growth of sesbania in high salt-affected soil centimeters.

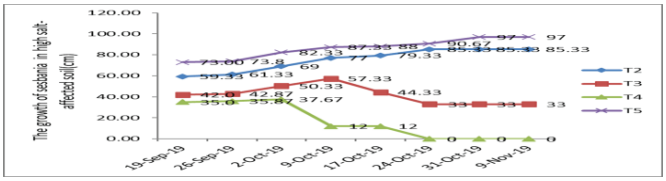


Table 1 The growth of sesbania in high salt-affected soil centimeters.

Treatments	Fresh biomass (gram)	Dry Biomass (gram)
T2 Saline Soil+ vermicompost	22.06[a]	16.72[a]
T3 Saline Soil + Coconut flake	16.79[b]	14.29[b]
T4 Saline Soil + rice husk	12.48[c]	12.12[c]
T5 Saline Soil+ vermicompost + rice husk + Coconut flake 25:25:25:25	22.78[a]	17.08[a]

CONCLUSION

Salt tolerant crops could not survive in T1 saline soil. Vermicompost and organic amendments could increase soil nutrients and reduce electrical conductivity (EC). The results from this study would be useful knowledge to help increasing farmers' income by cultivating salt tolerant crops in severe salt-affected soil.

REFERENCES

Iwai, C.B., Ta-oun, M., Seripong, S. and Champar-ngam, N. 2011.Vermicomposting good management practice for waste, soil and yield safety. Department of Plant Sciences and Agricultural Resources, Land Resources and Environment Section, Faculty of Agriculture, Khon Kean University.

Xu, L., D. Yan, X. Ren, Y. Wei, J. Zhou, H. Zhao, and M. Liang. 2016. Vermicompost improvesthe physiological and biochemical responses of blessed thistle (Silybum marianum Gaertn.) and peppermint (Mentha haplocalyx Briq) to salinity stress. Industrial Crops and Products. (94), 574-585.

ACKNOWLEDGMENTS

Thank to Research Developing and Learning Centre on Earthworm for Agriculture and Environment, Faculty of Agriculture for facilities provided.
Thank to for Integrated Water Resource Management Research and Development Center in Northeast Thailand, Khon Kaen University, Thailand.
Thanks are extended to the Division of Land Resource and Environment, Faculty of Agriculture, Khon Kaen University for the support of equipment for laboratory testing.