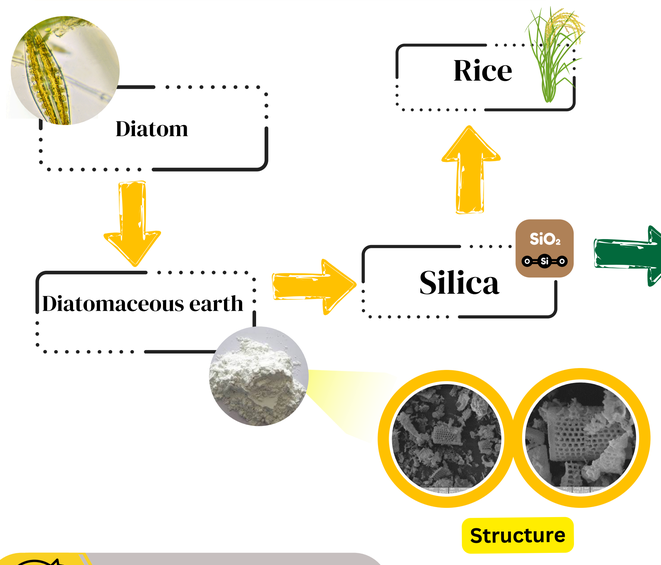
The potential use of diatomaceous earth for improvement of paddy rice production in Thailand

Fapailin Chaiwan [1], Natchanon Santasup[1,2], Choochad Santasup[1]

[1]Department of Plant and Soil SciencesChiang Mai University, Thailand
[2]Postharvest Technology Research Center Chiang Mai University, Thailand

INTRODUCTION



- Better in photosynthesis
- More responsive to nitrogen fertilizer
- Increasing rice's resistance to the toxicity of iron, aluminum, and manganese in soil

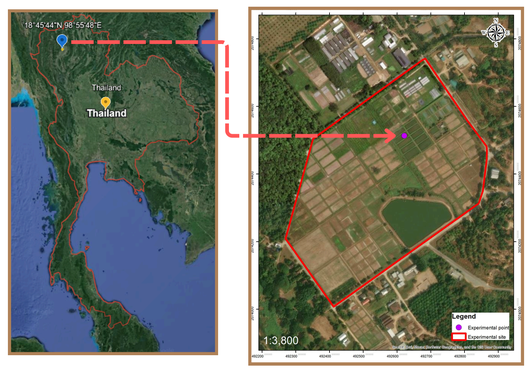
Objective

To investigate the optimal combination of diatomite and chemical fertilizers rate for enhancing rice growth and yield, which can serve as a guideline to reduce chemical fertilizer usage, improve rice quality, and increase soil fertility

MATERIALS AND METHODS

- **Experimental site**

Mae Hia Agricultural Research, Demonstrative and Training Center, Faculty of Agriculture, Chiang Mai University



- **Rice variety : San-pah-tawng 1**
- **Experimental design**

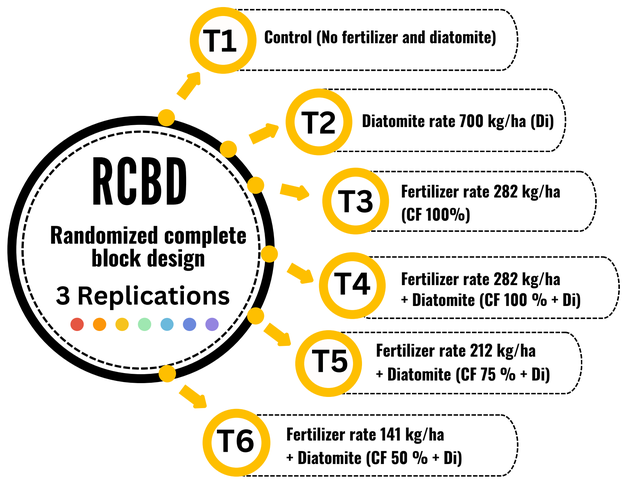


Table 1. Rate of diatomite, fertilizer application, and the amount of nutrients added to the soil

	Treatment	Fertilizer/diatomite application				Applied nutrient (kg/ha)		
		DAT*	Grade	Rate (kg/ha)		N	P_2O_5	K_2O
1.	Control	–	–	–	–	–	–	–
2.	Diatomite	14	0-1-2.2	700		–	7	15
3.	CF100	14	16-20-0	219	282	44	53	9
		35	15-15-15	63				
4.	CF100%+	14	16-20-0	219	282	44	60	25
		35	15-15-15	63				
	Diatomite	14	0-1-2.2	700				
5.	CF75%	14	16-20-0	165	212	33	47	14
		35	15-15-15	47				
	Diatomite	14	0-1-2.2	700				
6.	CF50%	14	16-20-0	110	141	22	34	12
		35	15-15-15	31				
	Diatomite	14	0-1-2.2	700				

*Noted: * DAT = day after transplanting*

Table 2 Diatomite properties in this study

Parameter	Value
pH	5.17
OM (%)	1.25
MgO (%)	0.11
Al_2O_3 (%)	6.81
SiO_2 (%)	61.49
P_2O_5 (%)	0.99
K_2O (%)	2.24

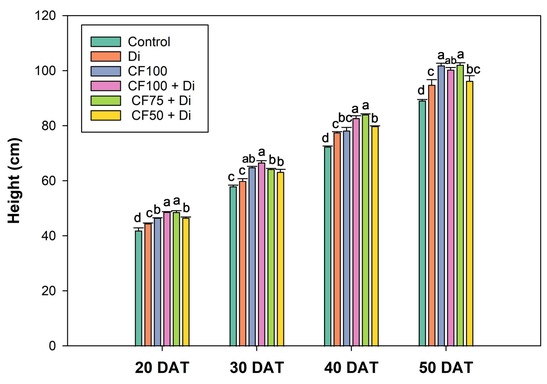
Table 3. Soil properties before the experiment

Parameter		Value
pH		5.63
EC (µS/cm)		38.80
OM (%)		1.64
Available P (mg/kg) (Bray II)		58.68
Exchangeable K (mg/kg)	NH_4OAc (1M) pH7	75.60
Exchangeable Ca (mg/kg)		225.50
Exchangeable Mg (mg/kg)		72.80

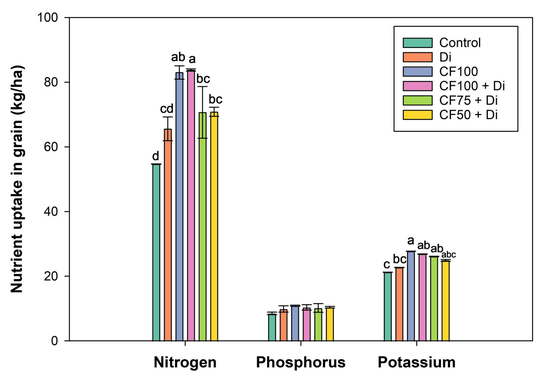
- **Data Record**

1. Plant height at 20, 30, 40 and 50 DAT
2. Yield and yield quality
   - Number of grain/panicles
   - 1,000 grain weight
   - Total yield
   - Nutrient uptake in grain

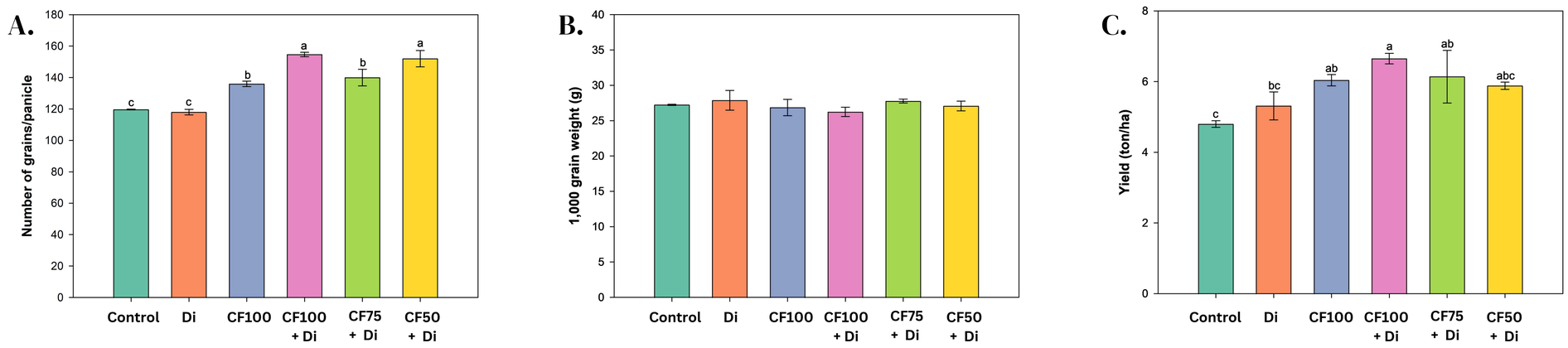
RESULTS



Effects of chemical fertilizer and diatomite application on the plant height at 20, 30, 40, and 50 DAT



Effects of chemical fertilizer and diatomite application on nutrient accumulation in yield



Effects of chemical fertilizer and diatomite application on Number of grains/panicle (A), 1000 grain weight (B) and Yield of rice (c)

- **Statistical data analysis**

Data were analyzed by analysis of variance (ANOVA) and the differences in mean values of the experiments were compared by least significant difference (LSD) at a 95% confidence level ($P<0.05$)

CONCLUSION

The application of diatomite in combination with chemical fertilizers tended to increase rice plant height, number of grains per panicle and yield when compared to chemical fertilizers alone, with treatment 4 (CF 100 % + Di) resulting in the highest rice yield (6.65 ton/ha).

ACKNOWLEDGMENTS

This study was supported by Trisap Mining and Agricultural (Thai) Company Limited and the Graduate School of Chiang Mai University.