

## Effects of Foliar Application of Zinc on Grain Yield and Zinc Concentration of Rice in Farmers' Fields

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### ABSTRACT

*Three field experiments were conducted on farms in Chiang Mai, Thailand in 2015 to evaluate the effects of: (i) foliar application of Zn on the grain yield and grain Zn concentration of rice and (ii) using Zn-enriched seeds in the next cropping on growth and yield. Zn was applied by foliar spraying 0.5% ZnSO<sub>4</sub> at three different growth stages: booting, flowering, and early milk stages. Foliar spraying of Zn improved the grain Zn concentration by 41% in one field, and an average of 30% across the three fields. The foliar-sprayed Zn did not, however, affect the grain yield in any of the fields. The Zn-enriched seeds also did not affect the grain yield of the plants in the farmers' fields in the next cropping, probably because of the high amount of soluble Zn already in the experimental fields. Clearly, the foliar application of Zn significantly increased grain Zn concentration, but had no effect on grain yield.*

**Keywords:** Foliar Zn fertilization, Farmers' field, Grain Zn concentration, Rice, Seed zinc enrichment

### INTRODUCTION

Zinc deficiency is a major malnutrition problem, resulting in severe health complications, including growth retardation and impaired immune system, combined with increased risk of infection, DNA damage, and alterations in mental function (Hotz and Brown, 2004; Gibson et al., 2007). The recommended daily intake of Zn is only 16 mg per day (National Research Council, 1989), but many commonly consumed foods do not provide this amount, especially in the developing world where cereal-based foods that are low in Zn predominate diets (Gibson et al., 2007; Cakmak and Kutman, 2017). For example, in South and Southeast Asia where rice is the staple diet, more than one-half a billion people have been estimated to be affected