

## **Boron Deficiency of Coconut (*Cocos nucifera* Lin.): A Field Note**

**By**  
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### **Abstract**

The soil and external supply of micronutrient boron (B) clearly affect the coconut crop's growth and development; and, thus, the yield and quality of produce, particularly during the dry season (< 75 mm rainfall/month).

A clear deficiency of B in young palms of several farms ( 11 out of 37) was observed in a project site of a nationwide multi-location piloting (MULTILOC ACTPRO) of coconut varieties and hybrids located in an inland area of Linabu, Balingasag, Misamis Oriental, Northern Mindanao, Philippines. The deficiency in young coconut is characterized by the presence of deformed leaf fronds or "little leaf", followed by non-splitting or delayed opening of leaflets that usually appear in zigzag-like pattern in advanced or severe deficiency stage. The apical shoot blackens, exhibiting growth failure and death of tissues and plant per se.

Photographs of the boron deficiencies in sample farms, and recommended correcting measures are presented.

### **INTRODUCTION**

The boron nutrient like calcium plays vital role in cell division and differentiation and cell wall integrity. It is considered highly immobile in the plant.

Deficiency of boron is clearly exhibited in the apical shoot, most active growing plant parts and tissues, particularly very young leaves of seedling and developing palms in the field. At early stage of deficiency, "little leaf" or deformed fronds develop, followed by abnormal non-splitting of leaflets, appearing zigzag-like leaves, at advanced stage. The apical shoot eventually blackens, exhibiting growth failure and death of tissues and the plant per se.

In the field, low yield of bearing palms could be associated to boron deficiency as a result of sterility and malformation of reproductive organs (as coconut pollen), thus causing very low fruit set and abnormal development of fruits.

### **FIELD OBSERVATION**

Eleven (11), out of 37 farms (225, out of 8,351 palms planted) in MULTILOC ACTPRO Project in Misamis Oriental have boron deficiencies ranging from mild to severe. All of the varieties planted (PCA 15-4, TAG x MRD, and Baybay), aging from one to two years were affected.

Out of the 225 palms with boron deficiency; 46 palms have severe deficiency, 57 palms with moderate deficiency, and 46 palms with severe deficiency (Table 1).

The palms with boron deficiency have the following plant growth data (average): 63.6 cm in girth size and 9 leaves.

On the average, four (4) leaves were affected by boron deficiency per palm.

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## MEASURES FOR CORRECTION

*Soil Amendment* – use organic fertilizers like chicken manure. It contains 15-100 ppm B (45 ppm average). It should be used to improve the physical condition of the soil (long-run) and could supply many micronutrients (B, Zn, Cu, Mn, Fe), including the other nutrients like N, P, K, Ca and Mg.

*Fertilizer Application* – Correction of B deficiency is done by both spraying (0.2% borax or other sources) and direct soil application of the appropriate rates of fertilizer. Spraying is commonly practiced in the nursery stage (1-1.50 g/seedling as an option).

There are several common B sources: [1] borax ( $\text{Na}_2\text{B}_4\text{O}_7 \cdot 10 \text{H}_2\text{O}$ , 11% B); [2] Sodium tetraborate ( $\text{Na}_2\text{B}_4\text{O}_7 \cdot 5 \text{H}_2\text{O}$ , 14% B); Disodium Octaborate Tetrahydrate ( $\text{Na}_2\text{B}_8\text{O}_{13} \cdot 4 \text{H}_2\text{O}$ , 20% B), and Boric Acid ( $\text{H}_3\text{BO}_3$ , 17% B) (Table 2).

**TABLE 1. MULTILOC ACTPRO BORON DEFICIENCY BENCHMARK DATA  
Linabu, Balingasag, Misamis Oriental**

Name of Cooperator	Date of Data Gathering	Cultivar	No. of Affected Palms	Average Girth Size (cm)	Average No. of Leaves	Average No. of Affected Leaves	Degree of Deficiency		
							Severe	Mod.	Mild
1. Florencio Reyes	8/00	PCA 15-4	12	98.3	11	7	9	3	
		TAG x MRD	27	86.1	11	8	16	9	2
2. Ramon Saa		Baybay	15	62.2	9	3		8	7
3. Lino Gorres		PCA 15-4	23	62.8	9	5		4	19
		PCA 15-4	8	79.0	10	5		1	7
		TAG x MRD	15	70.9	9	5		2	13
4. Rodino Mulo	9/16/00	Baybay	15	49.7	7	4	2	13	
5. Elias Mulo	7/26/00	PCA 15-4	1	17	6	3			1
6. Paquita Singsing	7/31/00	TAG x MRD	18	123.0	12	1		4	14
	7/31/00	Baybay	12	60.5	10	2		2	10
7. Editho Palma	9/15/00	Baybay	13	62.8	9	2	3	3	7
	9/15/00	TAG x MRD	37	62.5	11	2	9	5	23
8. Maximo Fortun		PCA 15-4	6	47.1	9	9			6
		Baybay	9	59.4	7	7	1	1	7
9. Nicolas Gorres	8/00	PCA 15-4	1	49.0	16	5	2		
10. Jaime Molo	7/27/2000	TAG x MRD	2	68.0	6	4		2	
11. Jose Virtudazo	9/12/2000	Baybay	10	23.3	5	2	4		6
<b>TOTAL</b>			<b>225</b>				<b>46</b>	<b>57</b>	<b>122</b>
<b>AVERAGE</b>				<b>63.6</b>	<b>9</b>	<b>4</b>			

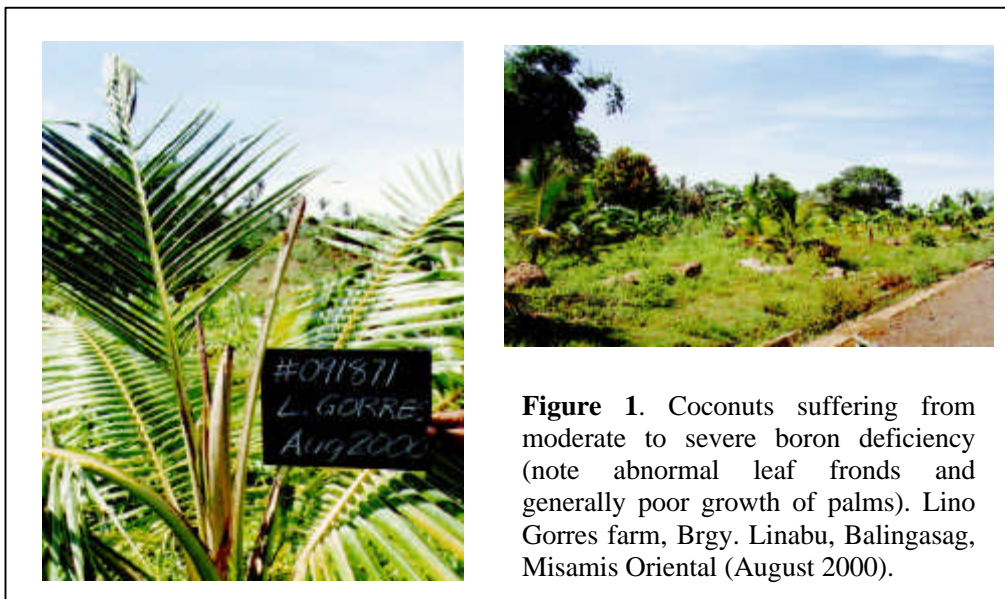
\* Date of borax application - August, 2000 at 25 g/affected palm

\*\* Degree of deficiency - severe = 70-100% of leaves are affected; moderate = 30-69%; and mild = 1-29%

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**Table 2. APPLICATION OF BORON TO COCONUT**

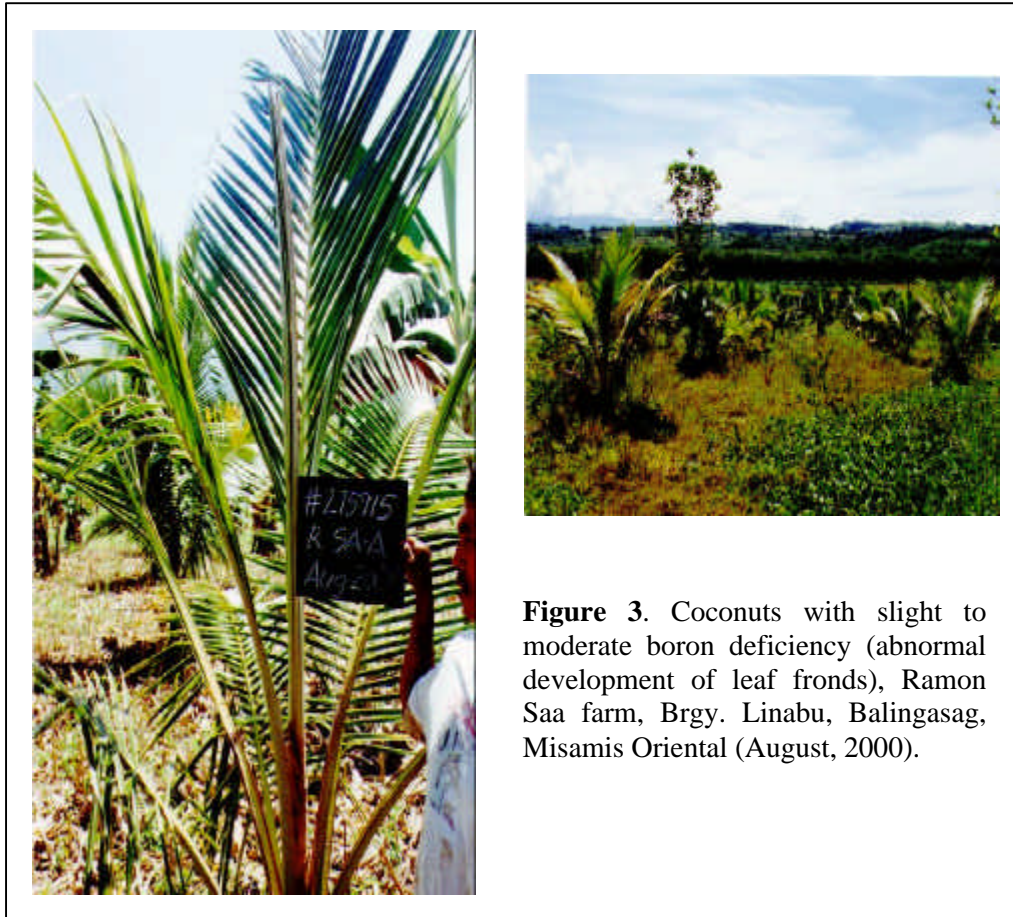
Stage	Source (select one)	Rate	Time and Method
Nursery	Borax/Sodium Tetraborate	0.2% (2 g/l H <sub>2</sub> O) @ 75-100 ml/seedling	1-2 times by spraying or drenching
1 year old	Borax/Sodium Tetraborate/ Octaborate	5-10 g/plant	Once/year by soil application
2-3 years old	Borax/Sodium Tetraborate/ Octaborate	15-20 g/plant	Once/year by soil application
4 years old and older	Borax/Sodium Tetraborate/ Octaborate	30-50 g/plant	Once/every 2 years soil application



**Figure 1.** Coconuts suffering from moderate to severe boron deficiency (note abnormal leaf fronds and generally poor growth of palms). Lino Gorres farm, Brgy. Linabu, Balingasag, Misamis Oriental (August 2000).



**Figure 2.** Coconuts suffering from severe boron deficiency. Florencia Reyes farm, Brgy. Linabu, Balingasag, Misamis Oriental (August, 2000).



**Figure 3.** Coconuts with slight to moderate boron deficiency (abnormal development of leaf fronds), Ramon Saa farm, Brgy. Linabu, Balingasag, Misamis Oriental (August, 2000).

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