PROCEEDING

INTERNATIONAL CONFERENCE ON SUSTAINABLE AGRICULTURE AND NATURAL RESORCES MANAGEMENT

"DRIVING SUSTAINABLE AGRICULTURE THROUGH DEVELOPING GREEN GROWTH STRATEGIES"

May 23, 2017 Medan

 ISBN 978-602-6997-70-8

Preface

First of all, thanks to Allah SWT, for giving us of bless and grace, the entitled " International Conference on Sustainable Agriculture and Natural Resources Management (ICoSAaNRM)" can be finished.

ICoSAaNRM 2017 organized by Agriculture Faculty of University of Muhammadiyah Sumatera Utara (UMSU). ICoSAaNRM provide an international forum for sharing knowledge, information, experience and research result as well as there view of pregress and discussion on the theme "Driving Sustainable Agriculture Through Developing Green Growth Strategies.

We would also like to express our heartiest to thank to University of Muhammadiyah Sumatera Utara, steering committees, member of organizing committee, Keynote speakers, HGKNI, Presenters, Reviewers, Moderators, and participants for support to success of this conference.

Thank you

Medan, May 23, 2017

ICoSAaNRM Committee 2017

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Keynote Speaker

Effect of K_2so_4 Dose and Frequency on Water Content of Red Chilli Varieties *(Capsicum Annuum* L.*)*

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ABSTRACT

The Red chili includes perishable foodstuffs such as susceptible to shrinkage due to loss of water, easily decomposed so must be pre-harvest handling techniques and proper post-harvest post-harvest handling. The aim of this research was to evaluate effect of K_2SO_4 dose and frequency on water content of red chilli varieties. This research was conducted at Experimental field Faculty of Agriculture, UMSU, Medan, from July to November 2016. This research used Split-plot design with two factors. The first factor was red chilli varieties (V) were TM 999 (V1), Lado (V2) and Landung (V_3). The second factor was K_2SO_4 dose and frequency with ten factors were K_0 = no K_2SO_4 (control), dose = 1,5 gr/litre frequency 6 x (K_1), 9 x (K_2) and 12 x (K_3), dose = 3 gr/litre frequency 6 x (K_4), 9 x (K_5) and 12 x (K_6), dose = 4,5 gr/litre frequency 6 x (K_7), 9 x (K_8) and 12 x (K_9). The results indicated that K_2SO_4 Dose and Frewuency showed significant effect on water content of red chilli varieties. Dose and frequency of K2SO4 showed significant effect with control where K_9 (4.5 g/litre K_2SO_4 with 12 times frequency) as the highest during the planting period on all test varieties were TM 999 with 75.77 % water content, Landung, with 77.53% water content, and Lado varieties with 81.64% water content.

***Keywords**: K_2SO_4, Capsicum annuum, variety, water content*

Introduction

Based on the Biro Pusat Statistik (2013), the area of chili harvest is 233,904 ha with 1,378,727 tons production and 5.89 tons / ha productivity. This productivity is still far from the productivity potential of chili produced in various studies. Furthermore, the Deptan (2009) reported that the production is also not yet able to meet consumption needs which reached 2.77 kg / capita / 2014. In order to needs of the chilli, the government was forced to import chili and other products such as onion and garlic from India.

The red chili (*Capsicum annum*) is an important horticultural crop in Indonesia and is one of the most popular pontencial fruit vegetables to be developed due to the high demand especially in tropical countries consumed in fresh or dry conditions (Hariyantini dan Santoso, 2001; Sarker dan Fazlur, 2003).

Big red chili is one type of vegetables that have a high water content in harvest. In addition to still experiencing the process of respiration, red chili will experience the process of timber. This physiological nature causes red chilli have a level of damage that can reach 40%. The low durability of red chilli can makes the price of red chili on the market very fluctuating. The right handling technology can save and increase the added value of red chili products (Prayudi, 2010).

This perishable nature is affected by the water content in the very high chili about 90% of the content of the red chili. High water content can be cause of chili damage during harvest season. This is due to the abundant harvest while the drying process can not take place simultaneously, causing the water content in chili is still in great condition, thus causing decay.

Potassium is an essential nutrient that is used in almost all processes to support plant life. Farmers often mention that potassium is a nutrient quality, because it affects size, shape taste, is the third major nutrient after N and P. Potassium has a valence of one and is absorbed in the form of K^+ ions. Potassium belongs to car elements in plants both in cells, in plant tissues, as well as in xylem and phloem. Potassium is widely present in the cytoplasm.

The deficiency of potassium in Solanaceae plants will inhibit the growth of plants due to the low enzyme activity of the leaf so that the photosynthesis and translocation process of photosynthesis becomes obstructed and will reduce the production of the harvest (Perrenoud, 1993). Furthermore, Hakim *et al*. (2008) reported that if the status of potassium in the soil is not sufficient for growth then the production will be reduced.

Besides potassium, sulfur in plants needs attention, because sulfur is an essential nutrient for plant growth. Sulfur plays an important role in plant metabolism (Schnug, 1990). Robson and Pitman (1983) reported that Sulfur-deficient plants may affect the amount of nitrogen uptake, resulting in decreased protein formation and also decrease the amino acid content of cystine, systeine and methionine. Marschner (1986) has reported that sulfur may increase amino acid systeine content and methionine. Kaunang (2004) states that 50% sulfur water supply provides *Panicum maximum* forage quality and the best *Centrosema pubescens.* Thus, it is important to find the mechanism of giving some optimum dose and K_2SO_4 frequency to increase the water content of red chilli (*Capsicum annuum* L.).

Materials and Methods

This research was conducted in UMSU experimental field at Jl. Tuar, Medan, from July to November 2012. The materials used in this research were chili seed, cow manure, calcium sulfate, silver metallic plastic mulch, polybag, bamboo, Dithane M-45 (80% mancozeb) and Decis 25 EC (ba deltamethrin 25 g / l) and Confidor 200 SL (ba imidacloprid 200 g / l). This research used split plot design with two factors. The first factor was variety as a main plot were V_1 = TM 999, V_2 = Lado and V_3 = Land and the secound factors was dose and K2SO4 frequency were K0 = 0, dose = 1.5 g / liter frequency 6 times; (K1) 9 times; (K2) 12 times; (K3) dose = 3 gr / liter frequency 6 times; (K4) 9 times; (K5) 12 times; (K6) dose = 4.5 gr / liter frequency 6 times (K7) 9 times; (K8) 12 times; (K9) application of fertilization wass done in the morning from 06.30 to 08.30 wib.

The research land measured 50 x 12 m. The land was cleared, ransacked and cleaned from the weeds and rocks. Then reversing the soil layer and soiling the soil. This research plot size was 280 cm x 120 cm with 30 plots / replicates. Number of replicates as much as 3, the distance between replicates 100 cm, and distance between plot 50 cm.

The installation of silver metallic plastic mulch was done after the application of manure (500 g / hole or 20 ton / ha) of fertilizer was sometimes given before planting by diluting the research plot,

adequate watering and basic fertilizer. Planting hole was made by hollowing mulch plastic with spacing of 70 cm x 50 cm. The primary function of silver metallic plastic mulch decrease the growth of pests and weeds, and reduces the evaporation of water and fertilizer by sun and keeps moisture, temperature, and soil moisture. Planting was done after 18 days after the seedling. firstly, seeds that are planted selected with the main criteria was the uniformity of growth both high and the number of leaves. Observed variables: plant height, number of flowers, weight of fruit perplot.

Results and Discussion

In this research, the concentration combination and potassium frequency of three varieties had showed significant effect only on 3rd harvest. The average of water content of red chilli varieties on potassium frequency concentration (Table 1).

In general, the highest water content of each variety had found in potassium was the third most needed nutrient crop after N and P. The features of this nutrient compared with N and P are rare plants showing deficiency or excessive symptoms. The higher chili elevation at K9 compared with eight treatment concentrations and other K_2SO_4 frequencies was thought to be caused by the plants getting enough K. As it is known that protein synthesis in plants is in dire need of potassium. Protein is the basic ingredient of new cell formation, so the plant has enough material for its growth (Marschner, 1995).

Table 1. The interaction of water content of red chili varieties on frequency of K_2SO_4 on 3rd harvest.

Variety	Water Content Harvest to-				
Treatment	1	2	3	4	5
V1	77.52b	77.81b	77.75b	78.10b	78.316b
V2	77.59b	77.96b	78.07b	77.97b	77.9237b
V3	84.12a	83.91a	84.19a	84.72a	84.8567a
Concentration					
K_0	81.83	83.50	81.75	82.08	83.2689
K_1	80.54	81.32	81.10	81.10	81.6511
K_2	80.70	80.92	81.03	81.03	81.0311
K_3	80.40	81.28	80.51	80.51	80.5067
K_4	79.77	80.07	80.10	80.66	80.6578
K_5	79.69	79.80	79.69	80.36	80.4689
K_6	79.91	79.04	79.80	80.02	80.1322
K_7	78.73	78.34	78.62	79.29	79.8422
K_8	78.67	77.78	79.11	79.45	79.3356
K_9	77.20	76.87	78.32	78.16	76.76

Means values in a column and row followed by unlike letter (s) are significantly different at 5% level using DMRT (Duncan Multiple Rentang Test).

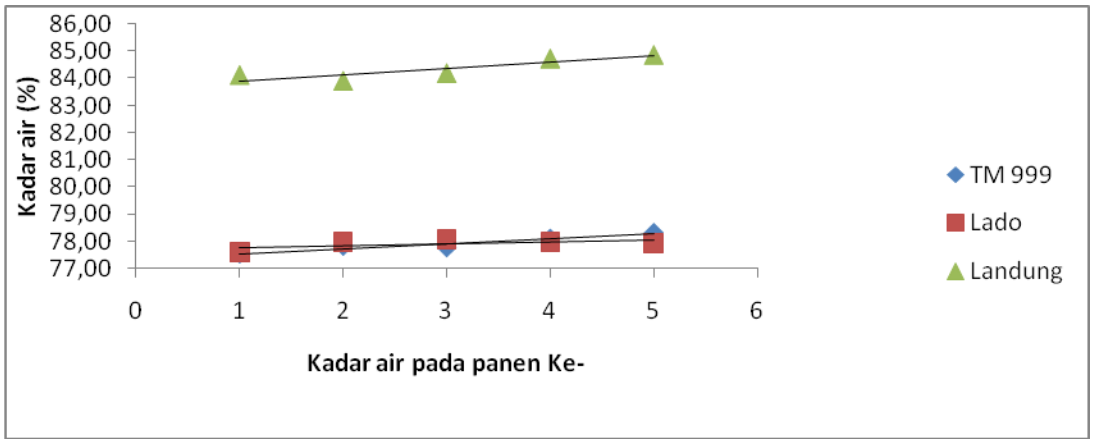

Figure 1. Water content in three red chilli varieties on K_2SO_4 at 1st to 5th harvest

Water content in three red chilli varieties had showed landung varieties as the highest average water content (Figure 1).

Morphological observations had been found that landung variety had large flue and contain a lot of water compared to Lado and TM 999 varieties.
The interaction of water content in three red chilli varieties on dose and K_2SO_4 frequency only occurs in the 3rd harvest (Table 2).

Table 2. The interaction of water content in three red chilli varieties on dose and K_2SO_4 fr equency at 3rd harvest.

Treatment	Varieties			Average
	V1	V2	V3	
K0	80.30a	79.44a	85.51ab	81.75
K1	80.69a	78.85ab	83.75abc	81.10
K2	79.18b	79.97a	83.94ab	81.03
K3	78.04c	78.19ab	85.29a	80.51
K4	77.11c	76.62b	86.57a	80.10
K5	77.45c	77.42b	84.20a	79.69
K6	75.89d	78.36ab	85.14ab	79.80
K7	75.92d	76.75b	83.19bc	78.62
K8	77.13c	77.55ab	82.66bc	79.11
K9	75.77d	77.53ab	81.64c	78.32
Average	77.75	78.07	84.19	80.00

Means values in a column and row followed by unlike letter (s) are significantly different at 5% level using DMRT (Duncan Multiple Rentang Test).

The interaction of water content in three red chilli varieties on dose and K_2SO_4 frequency had showed that V_3K_0 (85.51) as the highest and V_2K_9 (77.53) as the lowest. K2SO4 dosage of 4.5 gr / liter (K9) as the lowest water content of 78.32% showed significantly effect on K0, while K0 was 81.75% as the highest water content, showed no significant effect on K1, K2, K3, K4, K5, K6, K7 and K8.

K2SO4 4.5 gr / liter (K9) number of red chilli per plant as the highest. It caused by Sulfur (S) along calcium and magnesium are secondary plant nutrients. It means that S was needed by plants in large quantities but less than Nitrogen (N), Phosphosr (P), and potassium (K). Soepardi (1983) S is a constituent of amino acid methionine and cysteine. The structure of proteins in plants is largely determined by clusters of S. This element is also known as essential nutrients necessary for the production of chlorophyll.

The highest water content was produced without K2SO4 fertilizer (K0). It is indicates that nutrients from K_2SO_4 can affect the water content of red chillies

Conclusions

Dose and frequency of K2SO4 had significant effect on water content of red chilli per plot. Landung is a variety with water content K9 81.64% as the highest and lado variety (75.77%) as the lowest water content.

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