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EFFECTS OF SOME PLANT EXTRACT FRACTIONS ON ANTHRACNOSE (*Collettotrichum capsici*) OF CHILLI (*Capsicum annum* L.) **

ABSTRACT

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An experiment was conducted to evaluate the effects of plant extracts fraction on anthracnose of chilli. The experiment was arranged in randomized completly block design. The experiment consisted of 8 treatments with 4 replicates. The treatments were jatropa water extract fraction, ageratum N-*hexana* extract fraction, ageratum with no fractination, betel vine with no fractionation, propineb, and control. Variables in the experiment were disease incidence and disease severerity. The data homogenity were tested using Barlett test. The data were analysed statistically using anova and the difference between means were tested using LSD (α 5%). Results of the experiment showed that extracts of betel vine, ageratum, and jatropa leaves decreased disease incidence and disease severerity. The capability of betel vine with no fractionation and betel vine with water fractionation to decrease disease incidence and disease severerity were comparable to synthetic fungicide propineb

Key Words: *Pipper betel*, *Ageratum conysoydes*, *Jatropa multifida*, and *Colettotrichum capsici*.

INTRODUCTION

In Indonesia, chilli is an important crop after legume (Rusli *dkk.*, 1997). In order to fullfill the need of consumen, chilli were grown intensively and extensively, but untill now the productivity is still low (Girsang, 2008).

Based on Central Bureau of Statistics of Lampung Province (2015) the production of cabai besar of Lampung Province in 2014 was 32.26 x 10^3 ton decreased to 2. 97 x 10^3 ton, or decreased 8,44% compared 2013. The low productivity of chiili was affeced by some factors as variety grown, cultural practices, geographical condition, weed, pests, and diseases (Wardani & Ratnawilis, 2002; Zahra & Harapan, 2007).

Anthracnose was caused by olthree species of fungi *Colletotrichum. acutatum*, *C. gloeosporioides*, dan *C. capsici* (Montri *et al*., 2009). The fungi can survive in seeds in long

time (Than *et al*., 2008). *C. capsici* decreases chilli price via decreasing the quality of fruits (Nayaka *et al*., 2009).

Anthracnose have been reported from some countries as Malaysia, The Philipine, America, Thailand, Singapore, and Nigeria. Anthracnose attacts from nursery to postharvest (Syamsudin, 2002). The loss for the disease could reach 50% production (Kusnadi *et al*., 2009), Than *et al* (2008) reported the loss for anthacnose could reached 80%.

Recently, farmers use propineb to reduce the loss for anthracnose (Prijanto, 2009). Neverthless, the use propineb to control anthracnose on chilli could results some problems among them are fungal resistant to the fungicide and environmental problems (Thamrin & Asikin, 2005). For the reasons, new alternative measures must be used to control effectively and ecosafely, one of them is the use of botanical fungicides (Mirin, 1997).

MATERIALS AND METHODS

The experiment was conducted in Biotechnoly laboratory, Agricultural faculty, University of Lampung and in the farmer's land in Labuhan Dalam village, Tanjung Senang, Bandar Lampung from August- December, 2016.

The experiment was arranged in randomized completely block with dsign with 4 replicates. The treatments consisted of control (P0), *propineb* (P1), jatropa leaves water factionation (P2), ageratum leaves *N-hexana* fractionation (P3), betel vine leaves water fractionation (P4), jatropa leaves with no fractionation (P5), ageratum leaves with no fractionation (P6), and betel voine leaves with no fractionation (P7). Each experimental unit consisted of two plants. Variables of the experiment were disease incidence and disease severerity. Data homoginity were tested using Barlett test, analysed statistically using anova, and the different between means were tested using LSD test at 5% significance level.

Each extract fractions were made from fresh leaves. Extract fractions were made by preparing 200 g washed cleanly by tap water and dried in ambient air, the leaves was blended in a blender by adding 1000 ml of water, and then the leaves extract were poured into simple column equiptment. Fractionations were conducted via some steps i.e. via water, methanol, ethyl acetate, and N-hexane instantaneously. The extract fractions were evaporated using *rotary evaporator* to be dried powder.

Chilli seeds were nursed in a small pot made from banana leave filled with soil-manure (1:2, v/v) and put them in a tray. After a mont, the small plants were transplant into polybags (10 kg) filled with soil-manure media (2:1, v/v). In each polybag was grown one chilli plant. The plants were fertilized using NPK fertilizer with dosage 2 g/polybag. The plants were treated with Untuk mencegah serangan siput/ bekicot diaplikasikanfuradan to prevent snail and slugs, and to prevent other pest *deltametrin* 25 g/l was applicated.

Culture of *C. capsici* used in the experiment was isolated from anthracnose diseased chiili fruit. The surface of seven days old culture of *C. Capsici* was scraped and suspended in water to be solution containing 10^8 conidia/cc. The inocula were inoculated to chilli plants by spraying evenly with hand sprayer in the evening. The inoculation was conducted since the plant began to flower

The applications of plant extracts were conducted by spraying the extract evenly on the all plants using hand sprayer. The applications were done one our after pathogen inoculation *C. Capsici*. Concentration of the plant extract was 2000 ppm, applied with interval one week for seven times.

Observation on the disease incidence and disease severerity were done weekly for seven times after inoculation. Disease incidence was calculated using formula as follow:

$$TP = \frac{n}{N} x\ 100\%$$

Where:

TP = Disease incidence (%)

n = number of infecte fruits/plant

N = total fruits investigated/plant

Observation on the disease severity was conducted using formula described by Zadoks and Schein (1979) as follow:

$$I = \frac{\Sigma\,(n\ x\ v)}{N\ x\ V} x\ 100\%$$

Where:

I = Disease severerity (%)

n = number of fruits in each catagori

N = number of fruits observed

v = numeric value of each categori (score)

V = The highest score.

Scoring were done using modification of the method from Herwidyarti (2011) as follow:

Skor 0= no anthracnose symptom

Skor 1= anthracnose symptom on fruit between > 0% - 20%

Skor 2= anthracnose symptom on fruit between > 20% - 40%

Skor 3= anthracnose symptom on fruit between > 40% sampai 60%

Skor 4= anthracnose symptom on fruit between >60% sampai 80%

Skor 5= anthracnose symptom on fruit between > 80% - 100% , the fruit fallen.

RESULTS AND DISCUSSION

Disease Incidence

Table 1 shows that at 6 wai. generally all fractionation tested were significantly decreased anthacnose incidence on fruits, but jatropa water fractionation; while at 7 wai. Only propineb and Betle vine with no fractionation decreased the anthracnose incidence compared to control. Propineb and betle vine with no fractionation was more consistant than the other treatments

Tabel 1. Means of anthracnose incidence on fruits under the experimental treatments

Treatments	Anthracnose incidence (%)	
	6 wai	7 wai
P0 (Control)	42,88 c	41,81 C
P1 (*Propineb*)	1,79 a	5,43 A
P2 (Jatropa water fractionation)	27,31 bc	39,83 C
P3 (Ageratum N-*hexana* fractionation)	21,56 b	34,13 C
P4 (Betel vine water fractionation)	15,59 ab	38,44 Bc
P5 (Jatropa with no fractionation)	15,94 ab	34,72 C
P6 (Ageratum with no fractionation)	14,13 b	23,85 Bc
P7 (Betel vine with no fractionation)	18,39 b	15,70 Ab
F Count	3,71 *	3,93 *

Where: Data in the same column, followed by the same letter is not significantly different according to LSD test at α= 5%.
wai = weeks after inoculation
* = significantly different at α = 5%.

Disease severerity

Table 2 also shows that at 6 wai, generally, all fractionation tested are significantly decrease anthacnose severerity on fruits, but jatropa water fractionation and betel vine with no fractionation. While at 7 wai, generally, table 2 also shows that all fractionation tested significantly decrease the anthracnose severerity compared to control. Propineb and betle vine with no fractionation was also more consistant than the other treatments

Tabel 2. Means of anthracnose severerity on fruit (%) under experimental treatments

Treatments	Anthracnose severerity (%)	
	6 wai	7 wai
P0 (Control)	20,13 D	32,90 D
P1 (*Propineb*)	0,50 A	3,97 A
P2 (Jatropa water fractionation)	16,80 Bcd	25,86 Cd
P3 (Ageratum N-*hexane* fractionation)	15,56 Ab	9,16 Abc
P4 (Betel vine water fractionation)	3,37 Ab	13,41 Abc
P5 (Jatropa with no fractionation)	8,63 Abc	15,64 Abc
P6 (Ageratum with no fractionation)	6,33 Abc	17,81 Cd
P7 (Betel vine with no fractionation)	9,30 Abcd	5,59 Ab
F Count	2,76 *	3,64 *

Where: Data in the same column, followed by the same letter is not significantly different according to LSD test at α= 5%.
wai = weeks after inoculation
* = significantly different at α = 5%.

Based on the observation at 7 wai, the result of the experiment showed that all fractionation tested effectively control anthracnose severerity on fruit, but jatropa water fractionation and ageratum with no fractionation. Their effectiveness are comparable to synthetic fungicide propineb. It is in a line with Efri (2010). He reported that the effectivity of noni was comparable to propineb. Wiyatiningsih & Wuryandari (1998) also reported that *Kaemferia galanga* as effective as propineb to control disease.

The effectivity of Jatropa extract decreased when fractionated with water as solvent; on the contrary, the effectivity of Ageratum increased when fractionated with N-hexane as solvent. In the first case, probably water is not suitable solvent for jatropa, the active

ingredients do not solve in water. In the second case, the active ingredients in Ageratum are suitable solve in N-hexane .

In this experiment betel vine tended more effective than the other extracts. Betel vine leaves contain saponin, flavonoid, polyfenol, and essensial oil. Green Betel vine leaves extracted using water as solvent contain high phenol (Asmaliyah *dkk*., 2010). According to Satryawibowo (2015) betel vine leaves water fractionation extract at concentration 1.000 ppm could decrease the growth and sporulation of *C. capsici* in vitro. Betel vine leaves extract could control plant pathogen such as anthracnose of chiili for it contains 4.2% essensial oil 4,2%, eugenol as desinfectant (Liestiany & Fikri, 2012).

Irawan (2010) reported that red betel vine leaves extracted with methanol, etyl acetate, and n-*hexana* contain different ompounds. In methanol it contains alkaloid, saponin, and tanin. In etyl acetate it contains alkaloid, and in n-*hexane* it contain terpenoid.

Betel vine extract with no fractionation and with water fractionation could decrease anthracnose severerity for in the extract contain many compound such as flavonoid, saponin, and tanin. Flavonoid denaturate protein affected lipid layer, and destruct the cell wall. It could occure for flavanoid is lipophilic and bind phospholipid in cell membrane of the fungi and disturbing cell permeability. In inhibiting the growth of *C. Capsici*, flavonoid is supported by saponin that could decrease surface tension and result in permeability or cell leaks (Agnita *et al.*, 2014). Tanin act as anti microbe by inhibiting enzym *reverse* transkripstase and DNA topoisomerase and preventing cell formation (Robinson, 1995 in Nuria *et al*., 2009).

CONCLUSIONS

Ageratum N-hexane fractionation and jatropa with no fractionation could decrease severerity of anthracnose on chilli fruit. Betel vine with no fractionation and betel vine water fractionation could decrease both incidence and severerity of anthracnose of chilli on fruit. Their ability were comparable to propineb.

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