

THE USE OF CABBAGE AS BIOFUMIGANT TO
CONTROL *Ralstonia* sp. IN POTATOES (*Solanum
tuberosum* L.) CULTIVATION IN THE MIDLINE



PRESENTED BY :
SEPTJANA PRJ MASARJ
0810483044

BACKGROUND

Potato

- Potato (*Solanum tuberosum* L.) is one of the important commodity that has priority to be developed in the food diversification.

Facts

- The production of potato in Indonesia reaches 1 millions tones in 2008 and 1.1 millions tones in 2009. The average of national production is 16.51 tones ha⁻¹ with total area 71,000 ha. In this width of land, the potential production must be 3.5 millions tones per year

Problems

- *Ralstonia solanacearum* infection can inhibit and interfere with the potatoes growth even can reduce the production of potatoes to 80%.

Biofumigant

- The source of biofumigant are from Brassicaceae's family.
- The use of biofumigant as a part of sustainable agriculture management is because of its functions to maintain biological and natural biodiversity and balance, and also to improve the plant condition.



Objective of the research

- The objective of this research is to obtain the effective control techniques against *Ralstonia solanacearum* in comparison between chopped and mixed cabbage as potato cultivation biofumigant at midland.

Hypothesis

- Hypothesis of this research is the use of 100 g per polybag chopped cabbage is equivalent to 50 g per polybag mixed cabbage.

MATERIALS AND METHOD

Place And Time

- The research conducted at screen nursery house for venus orchid in Malang City.
- The altitude is more or less 700 at 27°C and 65 % air humidity
- The research begin from February to Mei 2012.

Tools

- Camera, ruler, weight, hoe, Knife, *Sprayer*, pincer, scissors, measuring glasses, blender, and *hand counter*

Materials

- 40x50 cm polybag, Granola potato variety, chicken manure, 15:15:15 NPK fertilizer, water, suspension *Ralstonia solanacearum*, fresh cabbage, and Agrept 20 WP.

The background of the slide is a photograph of a field with green plants, possibly rice, growing in rows. A purple rounded rectangle is centered in the upper half of the image, containing the word 'METHOD' in orange capital letters. Below this, a larger light purple rounded rectangle contains the text describing the experimental design. The entire slide is framed by a repeating watermark of 'WIJAYA UNIVERSITY' and 'BRAWIJAYA' in a light blue/grey color, oriented diagonally.

METHOD

Randomized Block Design which is consist of 9 treatments and 3 replications. Each treatment consists of 6 plants so there are 162 plants used.

Tretahments

P0 = Control (Without Bacteria Inoculation)

P1 = Control (With Bacteria Inoculation)

P2 = 50 g per polybag fresh cabbage (chopped cabbage)

P3 = 100 g per polybag fresh cabbage (chopped cabbage)

P4 = 150 g per polybag fresh cabbage (chopped cabbage)

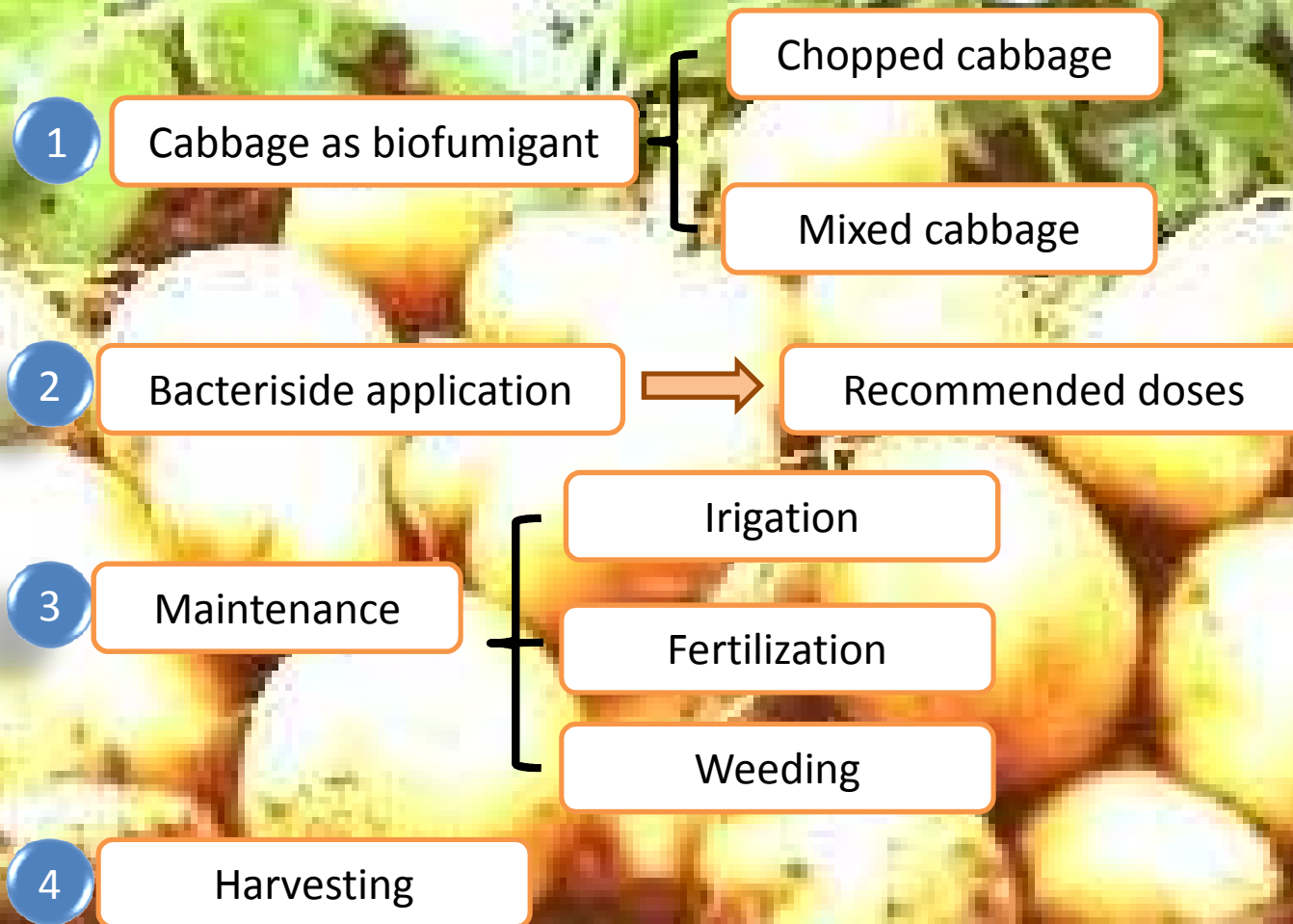
P5 = 50 g per polybag fresh cabbage (mixed cabbage)

P6 = 100 g per polybag fresh cabbage (mixed cabbage)

P7 = 100 g per polybag fresh cabbage (mixed cabbage)

P8 = Potato inoculated by bacteria and controlled by bactericide.

TECHNICAL IMPLEMENTATION





VARIABLE OBSERVATION

Non-destructive observation is conducted from 14 to 56 day after planting

Non destructive

- Plant height of potato

- Number of leaf of potato

- Intensity of disease attack

- Number of branch



VARIABLE OBSERVATION

Harvest observation is given during harvest at 56 day after planting

Harvest observation

Number of tuber per plant

Weight of tuber per plant

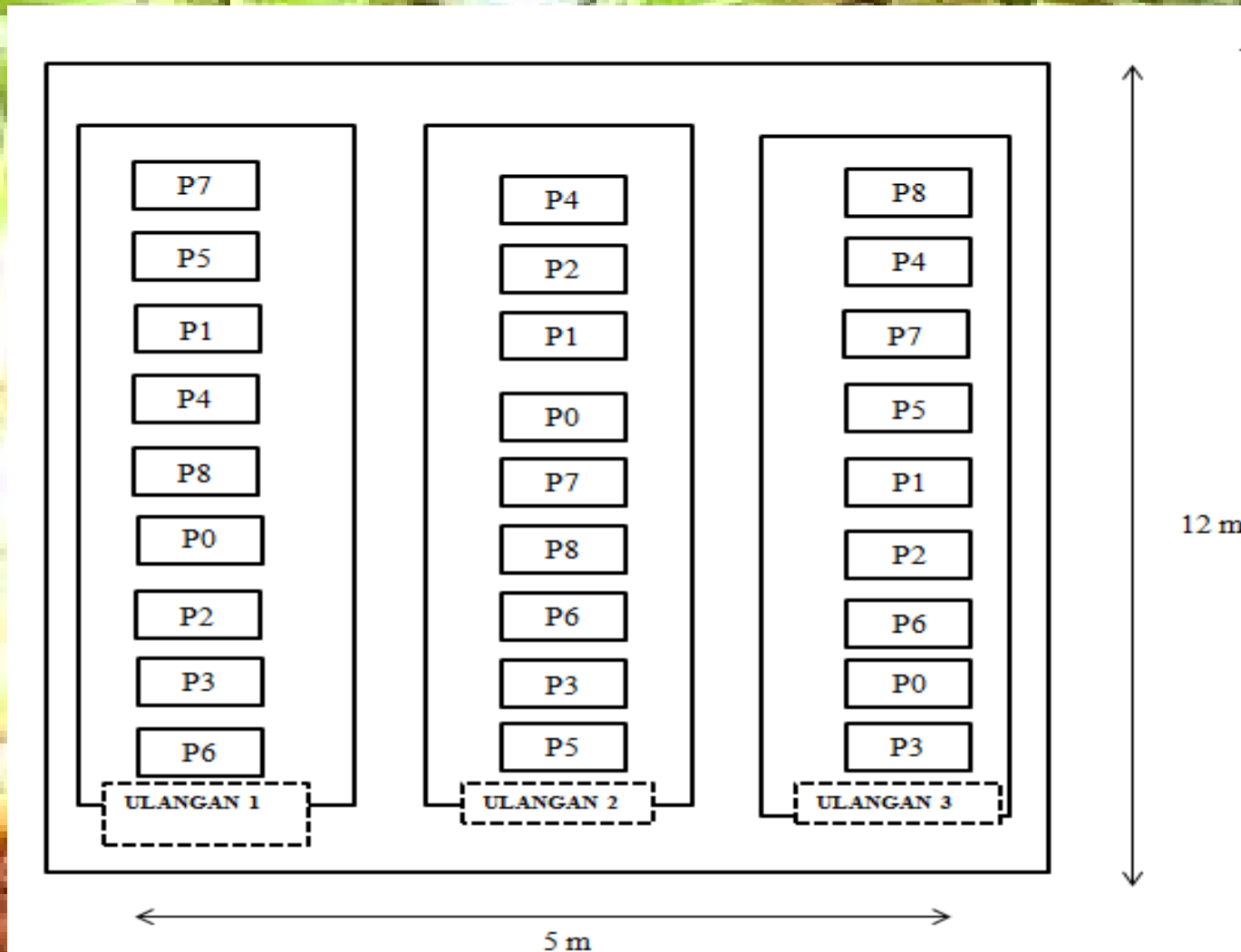
Weight average per tuber



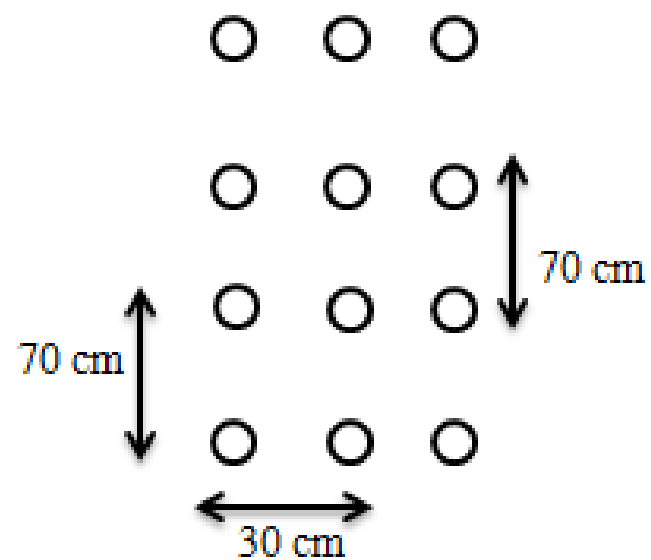
DATA ANALYSIS

The processing of observation data is analyzed by Analysis of Variance (F-Test with 5 % Significance Rate). There is significant effect in the treatment, and it is followed by Smallest Obvious Differential Test (BNT) at 5 % grade to ensure the existence of difference between treatments.

PLOT DESIGN



PLOT DESIGN





RESULT

PLANT HEIGHT

Treatments	Tinggi tanaman (cm) pada berbagai umur pengamatan (hst)					
	14 dap	21 dap	28 dap	35 dap	42 dap	49 dap
P0 = Control (Without Bacteria Inoculation)	21,46	34,68bcd	42,33ab	48,81abc	53,57	59,21
P1 = Control (With Bacteria Inoculation)	23,91	40,34cd	45,57ab	52,85bc	55,84	56,08
P2 = 50 g per polybag fresh cabbage (chopped cabbage)	20,33	29,98abc	33,09a	36,22a	40,10	44,23
P3 = 100 g per polybag fresh cabbage (chopped cabbage)	22,38	28,92ab	36,96a	50,04abc	48,62	33,35
P4 = 150 g per polybag fresh cabbage (chopped cabbage)	21,51	25,79a	33,54a	40,59ab	39,84	37,81
P5 = 50 g per polybag fresh cabbage (mixed cabbage)	27,61	43,18d	53,89b	61,11c	64,51	52,84
P6 = 100 g per polybag fresh cabbage (mixed cabbage)	26,84	40,10bcd	50,01b	56,44c	59,12	59,88
P7 = 150 g per polybag fresh cabbage (mixed cabbage)	23,59	39,83bcd	45,54ab	54,56bc	55,71	43,76
P8 = Potato inoculated by bacteria and controlled by bactericide	20,95	36,02abcd	44,43ab	61,19c	66,91	55,07
BNT 5 %	ns	11,21	12,72	15,52	ns	ns

NUMBER OF LEAVES

Treatments	Number of leaves					
	14 dap	21 dap	28 dap	35 dap	42 dap	49 dap
P0 = Control (Without Bacteria Inoculation)	24,89	42,83	59,71	61,92	74,59	61,72
P1 = Control (With Bacteria Inoculation)	33,22	34,39	49,06	57,89	64,48	57,42
P2 = 50 g per polybag fresh cabbage (chopped cabbage)	23,44	28,58	32,98	37,51	32,47	55,43
P3 = 100 g per polybag fresh cabbage (chopped cabbage)	24,83	31,94	36,89	47,28	46,89	27,94
P4 = 150 g per polybag fresh cabbage (chopped cabbage)	19,94	37,28	47,11	54,22	39	42,89
P5 = 50 g per polybag fresh cabbage (mixed cabbage)	39,67	41,5	44,56	71,28	65,44	56,53
P6 = 100 g per polybag fresh cabbage (mixed cabbage)	38,33	47,11	55,67	67,44	74,71	58,73
P7 = 100 g per polybag fresh cabbage (mixed cabbage)	35,78	44,11	48,61	53,28	51,72	55,33
P8 = Potato inoculated by bacteria and controlled by bactericide	27,89	44,89	52,94	63,67	67,17	64,39
BNT 5 %	ns	ns	ns	ns	ns	ns

NUMBER OF BRANCH

Tretahments	Number of branch					
	14 dap	21 dap	28 dap	35 dap	42 dap	49 dap
P0 = Control (Without Bacteria Inoculation)	5,61bc	5,83	7,94bc	9,11	11,09	9,62
P1 = Control (With Bacteria Inoculation)	5,83bc	6,56	7,84bc	9,28	9,73	6,22
P2 = 50 g per polybag fresh cabbage (chopped cabbage)	4,11ab	4,53	5,06a	5,74	5,22	4,72
P3 = 100 g per polybag fresh cabbage (chopped cabbage)	4,11ab	4,94	6,33ab	7,32	7,56	2,78
P4 = 150 g per polybag fresh cabbage (chopped cabbage)	3,83a	5,78	5,06a	8,39	5,67	2,67
P5 = 50 g per polybag fresh cabbage (mixed cabbage)	5,56abc	6,89	8,39bc	10,11	9,5	5,06
P6 = 100 g per polybag fresh cabbage (mixed cabbage)	6,50c	6,61	8,94c	10,71	11,51	8,71
P7 = 150 g per polybag fresh cabbage (mixed cabbage)	5,83bc	6,00	7,33bc	8,00	8,39	6,01
P8 = Potato inoculated by bacteria and controlled by bactericide	4,72ab	5,94	8,11bc	9,72	10,44	7,67
BNT 5 %	1,74	ns	2,17	ns	ns	ns

INTENSITY OF DISEASE ATTACK

Treatments	Intensity of disease attack <i>Ralstonia</i> sp (%)					
	14 dap	21 dap	28 dap	35 dap	42 dap	49 dap
P0 = Control (Without Bacteria Inoculation)	0	5,5	11,11	16,67	27,78a	44,44ab
P1 = Control (With Bacteria Inoculation)	0	0	16,66	22,22	27,78a	50,00ab
P2 = 50 g per polybag fresh cabbage (chopped cabbage)	0	16,66	38,88	44,44	61,11bc	72,22bc
P3 = 100 g per polybag fresh cabbage (chopped cabbage)	0	16,66	16,66	22,22	27,78a	66,67bc
P4 = 150 g per polybag fresh cabbage (chopped cabbage)	0	44,44	44,44	55,56	72,22a	89,89c
P5 = 50 g per polybag fresh cabbage (mixed cabbage)	0	16,66	16,66	38,89	38,89ab	66,67bc
P6 = 100 g per polybag fresh cabbage (mixed cabbage)	0	5,55	5,55	22,22	27,78a	44,44ab
P7 = 150 g per polybag fresh cabbage (mixed cabbage)	0	5,55	16,66	22,22	33,33a	44,44ab
P8 = Potato inoculated by bacteria and controlled by bactericide	0	0	0	16,67	27,78a	33,33a
BNT 5 %	ns	ns	ns	ns	27,12	32,37

NUMBER TUBER PER PLANT

Tretahments	Number of tuber per plant (g/tuber)
P0 = Control (Without Bacteria Inoculation)	0,99
P1 = Control (With Bacteria Inoculation)	0,33
P2 = 50 g per polybag fresh cabbage (chopped cabbage)	0,45
P3 = 100 g per polybag fresh cabbage (chopped cabbage)	0,42
P4 = 150 g per polybag fresh cabbage (chopped cabbage)	0,45
P5 = 50 g per polybag fresh cabbage (mixed cabbage)	0,4
P6 = 100 g per polybag fresh cabbage (mixed cabbage)	0,67
P7 = 150 g per polybag fresh cabbage (mixed cabbage)	0,77
P8 = Potato inoculated by bacteria and controlled by bactericide	0,88
BNT 5 %	ns

WEIGHT OF TUBER PER PLANT

Tretahments	Weight of tuber per plant (g/plant)
P0 = Control (Without Bacteria Inoculation)	6,76c
P1 = Control (With Bacteria Inoculation)	2,57a
P2 = 50 g per polybag fresh cabbage (chopped cabbage)	2,73ab
P3 = 100 g per polybag fresh cabbage (chopped cabbage)	3,59ab
P4 = 150 g per polybag fresh cabbage (chopped cabbage)	2,70ab
P5 = 50 g per polybag fresh cabbage (mixed cabbage)	2,87ab
P6 = 100 g per polybag fresh cabbage (mixed cabbage)	4,03ab
P7 = 150 g per polybag fresh cabbage (mixed cabbage)	4,30ab
P8 = Potato inoculated by bacteria and controlled by bactericide	4,96bc
BNT 5 %	2,38

WEIGHT AVERAGE PER TUBER

Treatments	Weight average per tuber (g/tuber)
P0 = Control (Without Bacteria Inoculation)	3,67b
P1 = Control (With Bacteria Inoculation)	1,67a
P2 = 50 g per polybag fresh cabbage (chopped cabbage)	1,72a
P3 = 100 g per polybag fresh cabbage (chopped cabbage)	1,73a
P4 = 150 g per polybag fresh cabbage (chopped cabbage)	3,17ab
P5 = 50 g per polybag fresh cabbage (mixed cabbage)	1,73a
P6 = 100 g per polybag fresh cabbage (mixed cabbage)	3,17a
P7 = 150 g per polybag fresh cabbage (mixed cabbage)	3,50b
P8 = Potato inoculated by bacteria and controlled by bactericide	3,50b
BNT 5 %	1,66



CONCLUSION

1. The use of cabbage as biofumigant in potato cultivation is not significant different in plant height, number of leaves, number of branch, number of tuber per plant and intensity of disease attack
2. The use of 50, 100 and 150 g per polybag chopped cabbage and mixed cabbage can not reduce intensity of disease attack.

DOCUMENTATION







Thank you for your attention...