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Study of Variety and Compost Fertilizer Dose of Cow Dung Against Productivity at Cauliflower (*Brassica oleracea* var. *botrytis* L.) in Kediri City Low Plain

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Abstract
The study of cow dung compost and productivity cauliflower varieties in lowland. The aims to : determine the influence of the interaction and relationship of cabbage varieties composted cow manure fertilizer on crop production cauliflower and dose of cow manure compost optimum in some varieties of cauliflower (*Brassica aleracea* var. *botrytis* L.), grown in lowland Kediri. Research methods using factorial treatment design consisting of two treatments and environmental design group randomized design, which consists of three groups. The first factor : cauliflower varieties, consisting of three levels, namely : varieties Sakata (V1), varieties Bima (V2), varieties of IPM 126 (V3) and the second dose of fertilizer of cow dung compost (S), consists of four level, namely : S1 = 0 ton/ha , S2 = 2 tons/ha , S3 = 3 ton/ha, and S4 = 4 tons/ha. The results showed that: occurs significant interaction effect of varieties and fertilizer compost manure to crop production cauliflower and production of heavy cauliflower varieties produced by Sakata optimum dose of compost manure 6,38 at tons/ha, varieties Bima at 8.3 tons/ha and varieties IPM 126 at 5.51 tons/ha .
Keywords : Cow dung compost, Cauliflower, Productivity

1. Introduction

Cauliflower (*Brassica oleracea* var. *botrytis* L.) are cultivated plants that have economic value and nutritional value are excellent. Nutrition Directorate of the Ministry of Health of the Republic of Indonesia (1981) states that the nutritional composition cauliflower in every 100 grams of material containing calories (25 cal.), Protein (2.4 g), fat (0.20 grams), Carbohydrates (4.9 gr), fiber (0.6 g), Abu (0.8 g), calcium (22 mg), phosphorus (72 mg), iron (1.0 mg), Sodium (8,0 mg), Potassium (314, 0 mg), niacin (0.7 mg), Vitamin A (90.0 SI), Vitamin B1 (0.1 mg), Vitamin B2 (0.1 mg), Vitamin C (69.0 mg), and water (1.7 g).

Cauliflower is a vegetable crops (Siong & Taha 2011; Dev et al., 2015; Elahi et al., 2015) and widely grown in India (Saha et al., 2015). Cauliflower also contains antioxidants, vitamin A, vitamin C, and some minerals (Myzak et al., 2007; Mahn &Reyes, 2012; Kamal et al., 2015). Cauliflower is a plant that has the bioactive compounds such as glucosinolates, phenolic compounds and vitamins (Girgin & El, 2015) and antimicrobial (Jaiswal et al., 2011; Survay et al., 2012), whereas the waste contains a number of phenolic compounds (Gonzales et al, 2012). Cauliflower is known to contain a compound that can accelerate the biotransformation, because it contains active compounds indole and sulforaphane (Martínez-Sánchez et al., 2008). Indole has been recognized as an inducer of enzyme for drug biotransformation. Both of these compounds capable of stimulating the cytochrome P-450 which is an anti-cancer to the human body (Perocco et al., 2006; Lee et al., 2008; Kumar & Andy, 2012; Sunarsih et al., 2015; Yadav et al., 2015)

In the past in Indonesia, particularly in Kediri cauliflower is only cultivated in the highlands; Due to technological developments cauliflower Agriculture in Kediri East Java is now can be cultivated in the lowlands, with a wide range of varieties, this situation needs to be studied or known varieties The best cauliflower in budiyakan on Low-lying, For the cultivation of cauliflower growers is still faced with the problem of difficulty in getting necessary inorganic fertilizers (Urea, ZA, KCl, SP36, Ponska) and while the results of research on the socialization function of the use of organic fertilizers are still can not be fully accepted by the farmers, so that research is still needed to study and socialize with continuous, on the other hand in the form of cattle waste manure is still a problem to be solved as a source of environmental pollution of air, water, and soil.

2. Material and Method

This research was conducted in September through November 2013, in Kandat Village the Kediri District, on flat and low-lying land with a height of 125 meters above sea level (asl), and regusol soil with pH 7. Materials used in the study: cauliflower seed varieties Sakata, Bima, IPM 126, Galuh Agritama compost, fertilizer NPK Mutiara, Dimasit insecticides, fungicides Ridomil, adhesives Top, white and silver mulch. The tools used in the study, namely: scales, meter, vernier caliper. Research methods using factorial treatment design consisting of two treatments and environmental design group randomized design, which consists of three groups. The first factor: cauliflower varieties, consisting of three varieties, namely: Varieties Sakata (V1), varieties Bima (V2), varieties of IPM 126 (V3) and the second dose of cow manure compost (S), consists of four levels, namely : D1 = 2 tons/ha, D2 = 3 tons/ha, D3 = 4 tons/ha and control D0 = 0 ton/ha. Observation variable

is heavy production cauliflower crop at harvest 45 days after planting. Analysis of the data using the F test followed by ANOVA and LSD 5% or 5% DMRT. Quadratic regression analysis was conducted to determine the optimum dose of cow manure compost on flower cabbage.

3. Result And Discussion

Based on the analysis of variance showed significant interaction occurred between verietas and dose of cow manure compost to heavy interest cabbage crop at harvest at 45 days after planting. Results of analysis of variance and treatment interactions graphic images varieties and fertilizer of cow dung compost. Treatment interaction graph varieties with cow manure compost fertilizer dose of weight cauliflower planting harvest at age 45 days after planting as in Figure 1.

Table 1: Variety weight fingerprint flower planting harvest age at 45 days after planting.

Age	Standard diversity	Degrees of freedom	Number of diversity	Central square	F - arithmetic		F table 5%	F table 1%
45 days after planting	group	2	41,405	20,703	1,069	ns	3,44	5,72
	treatment	11	157377,717	14307,065	738,848	**	2,26	3,18
	V	2	245,555	122,777	6,340	**	3,44	5,72
	D	3	156787,023	52262,341	2698,941	**	3,05	4,82
	VD	6	345,138	57,523	2,971	*	2,55	3,76
	Galat	22	426,008	19,364				
	the sum of all	35	157845,130					

Description: ns = no significant effect, * = significant effect, ** = was highly significant

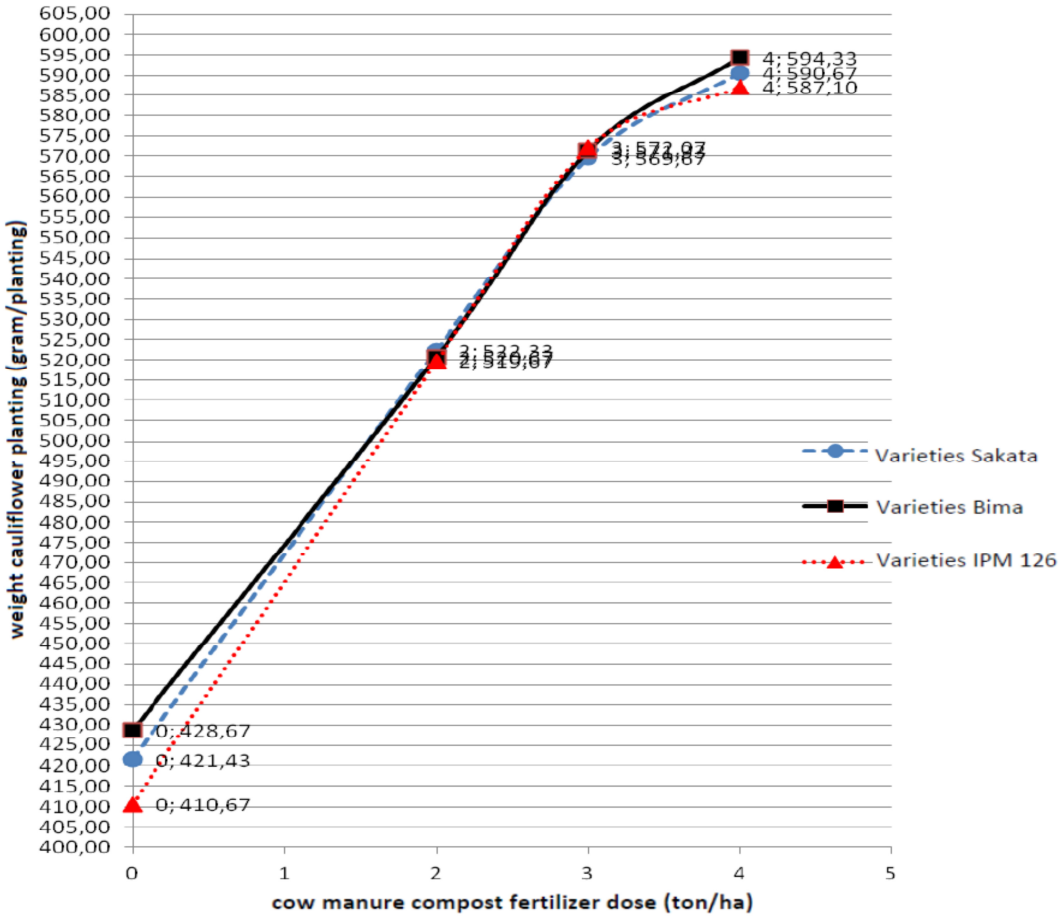

Figure 1. Treatment interaction graph varieties with cow manure compost fertilizer dose of weight cauliflower planting harvest at age 45 days after planting.

Results of analysis of variance (Table 1) and Figure 1, shows that there is significant interaction between varieties and dose of cow manure compost to heavy cauliflower crop at harvest 45 days after planting, this is indicated by the value of F calculated the combined treatment (VO) = 2.971 greater than 5% F table = 2.55 and smaller F table 1% = 3.76. The results of this analysis indicate the use of compost or cow manure fertilizer varieties and selection may increase the productivity of cauliflower plants on land in the lowlands. Ability increased productivity by using cow manure to increase in weight and varieties of flowers (productivity) on cauliflower can be seen in Table 2.

Table 2. Average weight of flower crop (g) the effect of the combined treatment and the varieties of cow dung compost fertilizer at harvest 45 days after planting

Combination Treatment		Average weight of flower crop (g) at harvest age 45 days after planting	5% DMRT Value
Var. Sakata (V_1)	0 Ton/ha (D0)	421,43b	7,45
	2 Ton/ha (D1)	522,33c	7,83
	3 Ton/ha (D2)	569,67d	8,06
	4 Ton/ha (D3)	590,67e	8,23
Var. Bima (V_2)	0 Ton/ha (D0)	428,67bc	8,35
	2 Ton/ha (D1)	520,67c	8,45
	3 Ton/ha (D2)	571,33d	8,52
	4 Ton/ha (D3)	594,33e	8,58
Var. IPM 126 (V_3)	0 Ton/ha (D_0)	410,67a	8,63
	2 Ton/ha (D_1)	519,67c	8,67
	3 Ton/ha (D2)	572,07d	8,71
	4 Ton/ha (D3)	587,10e	8,75

Description: The figures are accompanied by the same letter in the same column indicates no significant different at 5% DMRT test.

Based 5% DMRT (Table 2), the average weight of the highest cauliflower varieties produced by combined treatment with a dose Milky cow dung compost 4 tons/ha (V2D3), ie 594.33 grams of crops and 23.77 tons/ha but not significantly different from Sakata varieties of combination treatment with a dose of compost manure 4 tons/ha (V1D3), ie 590.67 grams of crops and 23.63 tons/ha and also a real no different with the combination treatment with doses of 126 IPM varieties compost manure 4 tons/ha (V3D3), ie 587.10 grams crops and 23.48 tons/ha.

Average weight of the lowest cauliflower varieties produced by combined treatment with a dose of IPM 126 cow dung compost 0 ton/ha (V3D0), it shows on each variety without being given cow dung compost cauliflower menghasilan most weight lower than fed with cow dung compost. Cow dung compost contains nutrients or nutrients needed by plants cauliflower, so as to increase the productivity of heavy interest when compared with non-fertilized with cow dung compost. Muni (1999), compost can improve soil fertility and improve soil properties in addition to having the composition of the content of nitrogen (N), Posphor (P), Potassium (K) is needed by plants. Susanto (2002), states that compost provides nutrients (NPK Ca Mg) in the form available to plants in the amount of balance, and research results Talkah (2004) concluded compost can increase the productivity of bean plants (*Vigna sinensis*), beans (*Phaseolus vulgaris* L), Tomato (*Licopersicum esculentum* Mill), Watermelon (*Citrus vulgaris* schard) sweet black varieties; and research results Talkah (2008), concluded that: the use of organic fertilizers can increase the weight of the fruit on the plant Melon (*Cucumis melo* L.).

Phallus & Marsono (2008) that the organic fertilizer has a complete nutrient content in small amounts, although the levels are low but able to improve soil conditions. Organic fertilizers mempuyai-organic C content is quite high and has a nutrient content of Nitrogen, Phosphorus (P), Potassium (K) and calcium (Ca), Organic fertilizers make the soil structure and the air for the better that will ease the plants absorb nutrients needed by plants. Good soil air affects the smoothness of respiration, increasing the population of microorganisms, supports microbial activity involved in the supply of nutrients,enhance absorption of water and power savings, and facilitate the absorption of water and nutrients by plant roots can directly affect plant growth. Mulyani & Kartasapoetra (1998) stated that the nutrient content of N, P, and K contained in organic fertilizers could stimulate photosynthesis and metabolic activities are very important in the process of plant growth cauliflower,

so that vegetative growth will be better. Nitrogen needed for plant growth mainly stems, branches and leaves, thus the availability of sufficient nutrients for growth with the addition of organic matter to the soil it will produce a cauliflower plant height for the better. Shows the difference in the average weight of cauliflower on each variety because of the influence of cow dung compost fertilizer, models or trend quadratic dose effect of cow manure compost to heavy cauliflower is presented in Figure 2.

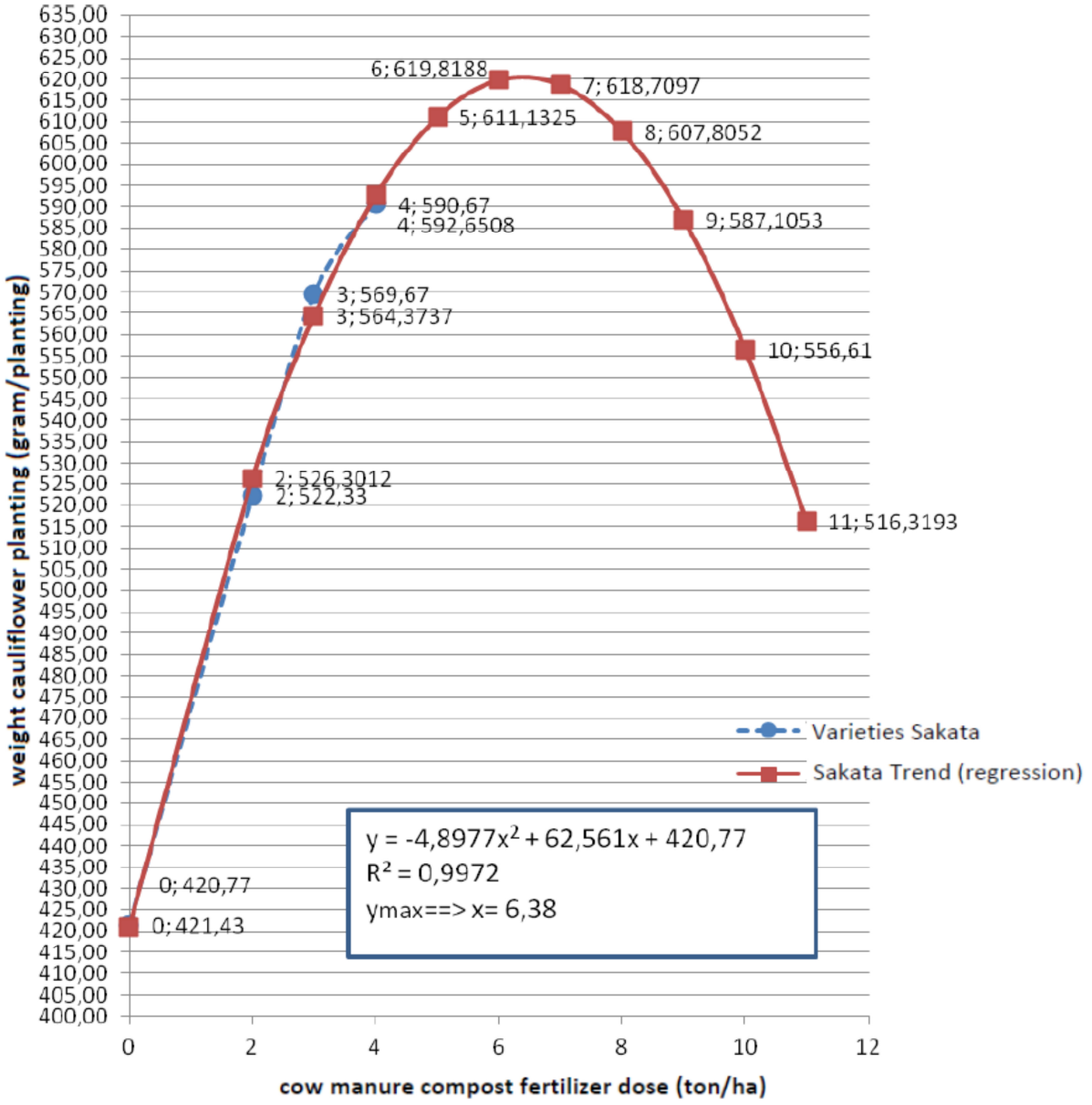

Figure 2. Dose effect cow manure fertilizer model of weight cauliflower planting Sakata varieties

Figure 2, the effect of dose of cow manure compost to heavy cropping varieties of flowers Sakata suggests a model quadratic the equation Y = 420.77 + 62.561 X - 4.8977 X2 with R^2 = 0.997, where Y is the variable heavy flower planting and X is the dose of cow manure compost. The equation can be determined the optimum dose of cow manure compost, which amounted to 6.38 tons/ha. Dose effect cow manure fertilizer model of weight flower planting Bima varieties as in Figure 3.

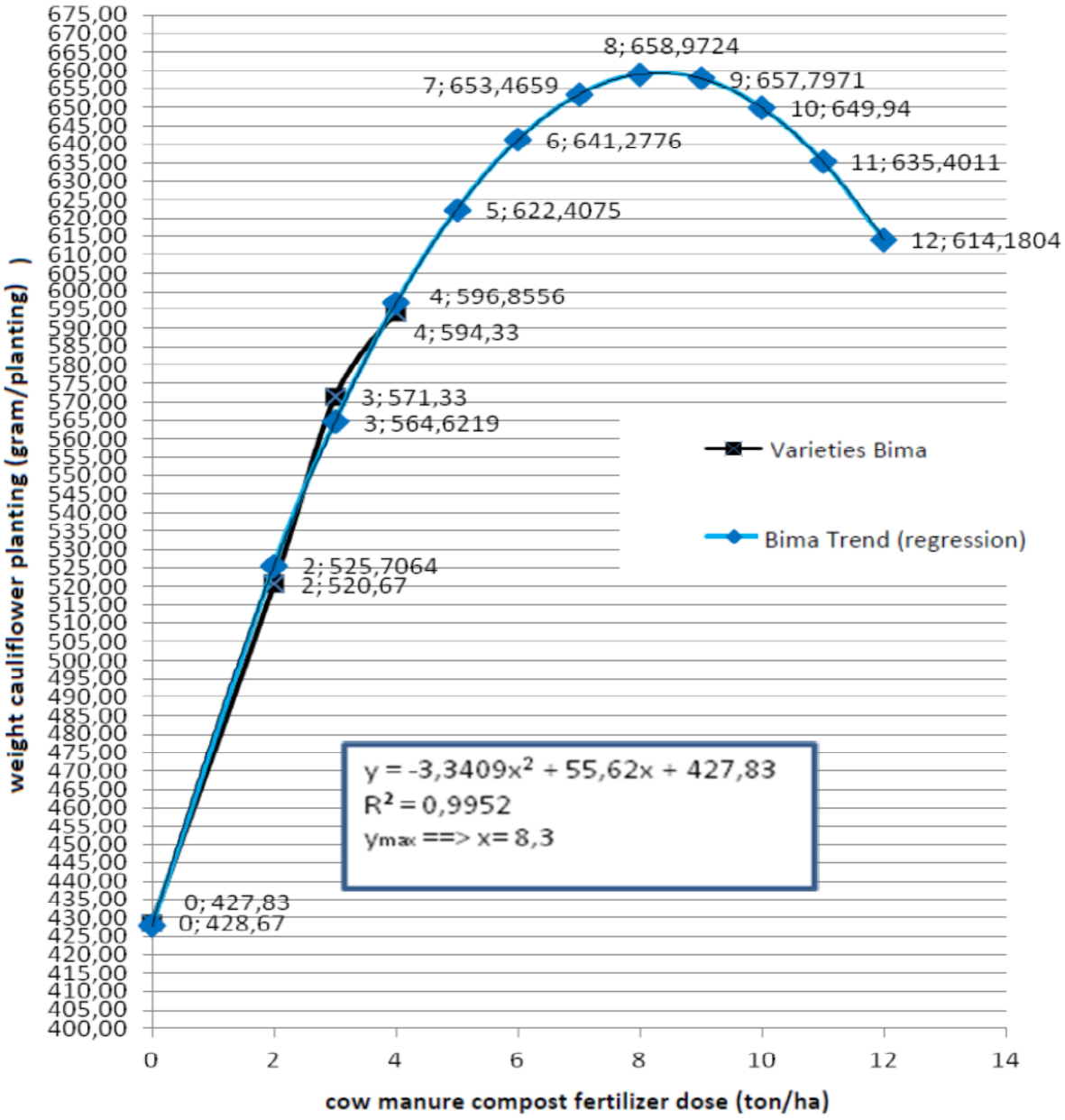

Figure 3. Dose effect cow manure fertilizer model of weight cauliflower planting Bima varieties

Figure 3, the effect of dose of cow manure compost to heavy cropping varieties flower show Shows quadratic models with equation Y = 427.83 + 55.62 X - 3.3409 X2 with R^2 = 0.995, where Y is the variable heavy flower planting and X is the dose of cow manure compost. The equation can be determined the optimum dose of cow manure compost, which amounted to 8.38 tons / ha.

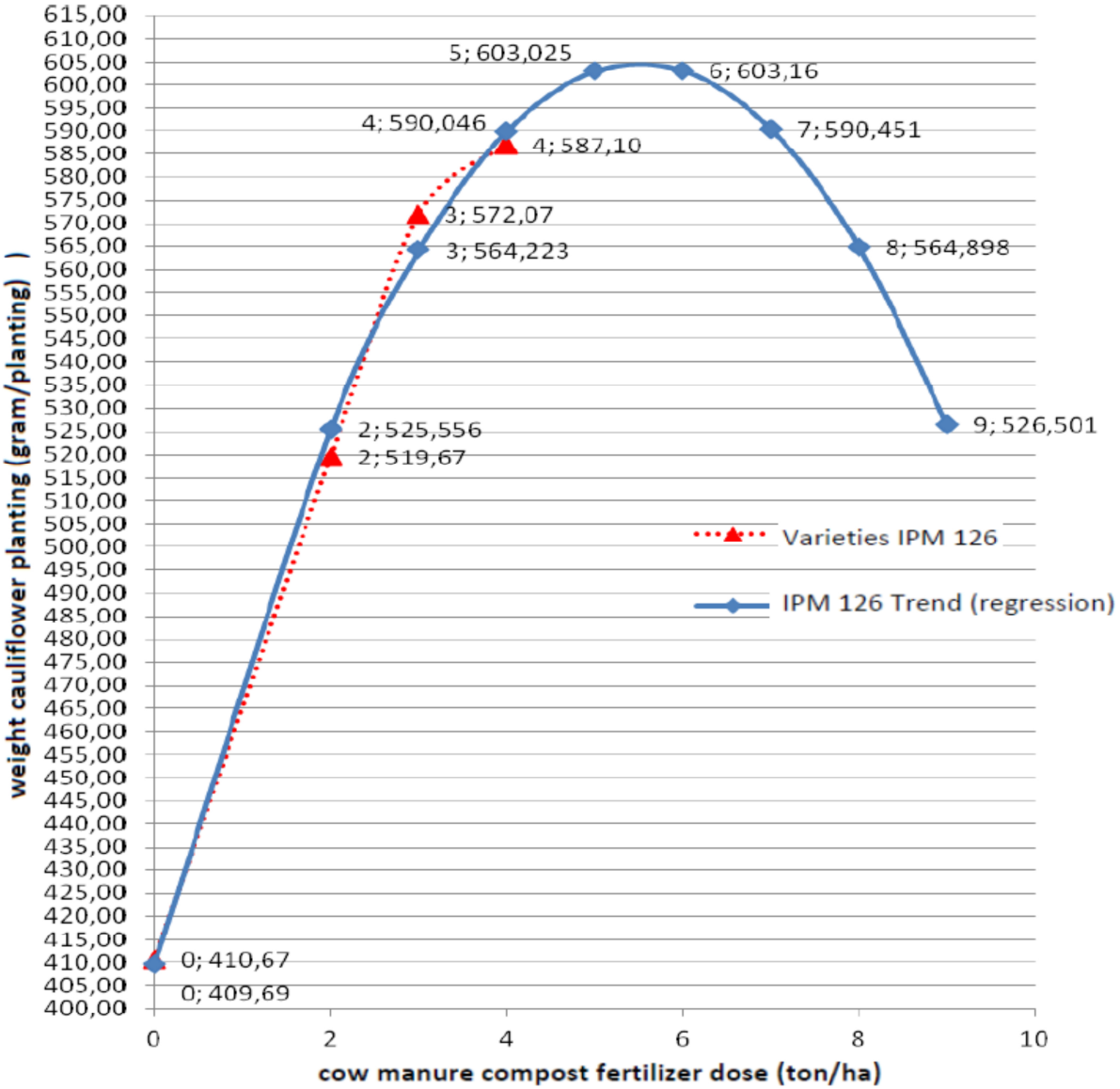

Figure 4. Dose effect cow manure fertilizer model of weight cauliflower planting IPM 126 varieties

Figure 4, the effect of dose of cow manure compost to heavy cropping varieties flower show quadratic models with the equation Y = 409.69 + 70.777 X - 6,422 X2 with R^2 = 0.995,where Y is the weight variable rate planting and X is the dose of cow manure compost. The equation can be determined the optimum dose of cow manure compost, which amounted to 5.51 tons/ha.

4. Conclusion

1. Occurs significant interaction effect of varieties and fertilizer compost manure to crop production Cauliflower (*Brassica aleracea* var. *botryti*).
2. Average weight of the highest cauliflower varieties produced by combined treatment with a dose Bima cow dung compost 4 tons/ha (V2D3), ie 594.33 grams of crops and 23.77 tons/ha but not significantly different from Sakata varieties combination treatment with a dose of compost manure 4 tons/ha (V1D3), ie 590.67 grams of cropping or 23.63 tons/ha and also not significantly different from IPM 126 varieties of combination treatment with a dose of cow manure compost to 4 tons/ha (V3D3), ie 587.10 grams of cropping or 23.48 tons/ha.

3. Production of heavy cauliflower varieties produced by Sakata optimum dose of compost manure 6.38 tons/ha, Bima varieties at 8.3 tons/ha and varieties IPM 126 5.51 tons/ha.

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