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Evaluation of chrysanthemum residue compost for seedling production and cabbage cultivation

(Penilaian kompos sisa bunga kekwa untuk pengeluaran anak benih dan penanaman kubis)

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Key words: chrysanthemum residue compost, organic nutrient source, cabbage, plant nitrate, heavy metal contents

Abstract

The objective of this study was to evaluate the efficacy of chrysanthemum residue compost (CC) as an organic nutrient source for seedling growth and cabbage production in the highlands. Glasshouse studies using CC on five seedlings (chinese cabbage, cauliflower, lettuce, tomato and chrysanthemum) gave superior or equivalent dry biomass, compared to two commonly used growth media.

Chrysanthemum residue compost was evaluated at 0, 15, 30 and 45 t/ha in the field incorporated with inorganic fertilizer (NPK) at 0, 25, 50, 75 and 100% (2 t/ha). Results obtained showed significant yield responses to CC and inorganic fertilizers. Significant CC and NPK interaction effects were also obtained. When CC was used as the sole nutrient source, yields increased by 133% (from 5.8 t/ha at zero fertilizer to 13.5 t/ha at 30 t/ha CC). The yield (29.1 t/ha) obtained with 45 t/ha CC, was comparable to the yield (31.4 t/ha) obtained from poultry manure (PM) applied at 40 t/ha. Highest yield (50.5 t/ha) using CC, was obtained with 30 t/ha CC + 2 t/ha NPK. This yield was comparable to that obtained from the control treatment (20 t/ha PM + 2 t/ha NPK) which yielded 53 t/ha. Though lower yield was obtained with organic fertilizer as the sole nutrient source, the grower would be compensated by the premium price that organic produce commands.

It is concluded that chrysanthemum residue compost is an effective organic nutrient source for vegetable cultivation. Chrysanthemum compost is also an excellent organic nutrient source for raising seedlings.

Introduction

Previous studies in Malaysia, using various organic sources on vegetables have shown that poultry manure (PM) outyielded several other organic sources available in the country (Vimala, Mah, Roff, Ong et al. 2000; Vimala et al. 2001). Studies elsewhere too, have reported higher yields with PM compared to other organic sources (Rice et al. 1993; Maynard 1994; Maraikar et al. 1996). Though restricted use of PM is allowed in organic farming under Malaysian

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Organic Certification Standards (Anon. 2001), it is however, not favoured by organic growers because of its foul odour, fly menace and the associated health risks. The search for easily available and affordable organic sources for organic vegetable cultivation is still on.

Chrysanthemum discards (leaves, stalks and roots, and unmarketable flower stalks) are available in large quantities (1.5 kg/m^2/3 months) from the thriving flower industry in Cameron Highlands, occupying about 400 ha. The chrysanthemum residue is presently discarded in unsightly heaps by the flower farms and packing houses. Recently, MARDI successfully converted these residues to compost (Wong 2003). The compost was prepared using discards from chrysanthemum farms and packing houses. Fillers such as cocoa peat and tea-clippings from tea factory wastes were added. A one-tonne heap was prepared from these materials and composting conditions regulated via temperature monitoring. When the compost heap reached 60 °C for 4 h, the heap was aerated by turning. The compost was considered mature when the compost heap reached ambient temperature.

This paper investigates the efficacy of chrysanthemum residue compost (CC) on seedling biomass production. Chrysanthemum residue compost was also evaluated as an organic nutrient source for cabbage cultivation in the highlands.

Materials and methods

Glasshouse studies

Chrysanthemum residue compost (CC) as a nutrient source for seedlings was evaluated for its efficacy on four vegetable crops and on chrysanthemum, in five separate experiments in a glasshouse. The chemical characteristics of CC (mean of three samples) are presented in *Table 1*. The vegetables tested were cauliflower (Rami 2), chinese cabbage (F1 hybrid), lettuce (Tall Utah) and tomato (Mone Star). Seeds were sown in seedling trays containing sieved sand (2 mm) mixed with 5, 10, 15, 20 and 25% by volume of CC. Each treatment consisted of five plants in individual pots of the seedling tray. The experiment was arranged in a randomised complete block design with five replicates giving a total of 25 plants per treatment. Dry biomass of all the crops was determined when the crops were harvested at 30 days after sowing. Control treatments consisted of the farmer's usual formulation (3 topsoil + 2 sand + 1 poultry manure) and a commercially available potting medium.

Table 1. Chemical characteristics of chrysanthemum residue compost (CC)

	Values	Calculated nutrients (kg) in 45 t/ha CC
Macronutrient (%)		
N	2.69	1 211
P	1.01	450
K	4.68	2 106
Ca	2.80	1 260
Mg	0.63	284
Na	0.35	–
Micronutrient (ppm)		
Mn	839	38
Zn	463	21
Cu	421	19
B	43	2
Heavy metal (ppb)		
Cd	298	nr
Pb	2 743	nr
As	7 462	nr
Hg	171	nr
Others		
Crude Fibre %	23.59	nr
EC (dSM^{-1})	6.50	nr
TC (%)	32.32	nr
pH	8.1	nr
CN ratio	11.9	nr

nr = Not relevant

Field studies

The experiment on cabbage (KY Cross) was conducted on saprolitic sandy loam subsoil in MARDI Station, Cameron Highlands. The experimental site was cleared, ploughed and rotovated and 4 m x 1 m raised plots were made. The soil analysis is presented in

Table 2 (mean of 15 samples). Chrysanthemum compost was applied on the plots at 0, 15, 30 and 45 t/ha and worked into the soil one week before transplanting. One-month-old cabbage seedlings were transplanted at a planting distance of 60 cm x 60 cm to give 14 plants/plot. Inorganic fertilizer ($N:P_20_5:K_20:Mg0$ = 12:12:17:2) at 0, 25, 50, 75 and 100% (2 t/ha) was applied in two split applications, at one month and two months after transplanting. The treatments were arranged in a split-plot design with three replicates. Treatments with poultry manure (PM) at 40 t/ha and 20 t/ha PM + 2 t/ha inorganic fertilizer served as controls.

Table 2. Soil characteristics of experimental site before experiment

	Mean
pH	5.7
Organic carbon (%)	0.60
Conductivity [cmol (+)/g]	34.65
Total N (%)	0.90
CEC [cmol(+) g]	7.12
Soluble P (meq/100 g)	112.17
Mg (meq/100 g)	0.51
Ca (meq/100 g)	6.33
Na (meq/100 g)	0.19
K (meq/100 g)	0.38
Sand (%)	64
Silt (%)	21
Clay (%)	13

Canopy diameter of two centre plants was measured one week before harvest for all treatments. The diameter of marketable head of the two centre plants in selected treatments was measured at harvest. These two plants were sampled for dry weight determination followed by chemical analysis. Harvesting was done at three months after transplanting. Biological and marketable yields were recorded. Chemical analysis was done at MARDI's Analytical and Quality Assurance Laboratory. All data obtained were subjected to statistical analysis (Steel and Torrie 1980)

Results and discussion

Glasshouse studies

Shoot dry biomass of chinese cabbage cauliflower, lettuce, tomato and chrysanthemum are presented in *Table 3*. Chrysanthemum compost (CC) at the optimum rates for each crop gave yields comparable to the commercial nursery medium and the farmers' traditional medium for chinese cabbage, and cauliflower. With lettuce, significantly higher yields were obtained with 15% CC compared to both the commercial nursery medium and the farmers' traditional medium. For chinese cabbage, lettuce and tomato, increasing CC application beyond 15% did not significantly increase dry biomass. For chrysanthemum

Table 3. Shoot dry biomass (g/plant) of seedlings at various rates of chrysanthemum residue compost (CC)

	Chinese cabbage	Cauliflower	Lettuce	Tomato	Chrysanthemum
5% CC	0.18c	0.46a	0.07de	0.14c	0.76ab
10% CC	0.24bc	0.46a	0.12c	0.21b	0.74abc
15 % CC	0.40ab	0.44a	0.16ab	0.26a	0.80a
20% CC	0.32abc	0.37ab	0.18a	0.26a	0.72abc
25% CC	0.41ab	0.44a	0.13bc	0.27a	0.67bc
Commercial nursery medium	0.44a	0.33b	0.06c	–	0.71abc
Farmers traditional medium	0.31abc	0.40ab	0.11cd	–	0.64c
Mean	0.33	0.42	0.12	0.23	0.71
Significance	**	*	***	***	*
CV %	40.16	17.45	27.20	11.19	9.91

Mean values with the same letter within columns are not significantly different according to DMRT
*Significant at 5%; **Significant at 1%; *** Significant at 0.1%

Table 4. Analysis of variance (ANOVA) for cabbage canopy diameter

Source	DF	Mean square	F value
Rep	2	80.97	4.05*
Compost	3	341.82	17.10***
Error (a)	6	22.57	–
NPK	4	835.66	41.80***
Compost x NPK	12	44.90	2.25*
Error (b)	32	19.99	–

Mean = 71.76; SE = 4.47; CV(%) = 6.23
*Significant at 5%; **Significant at 0.1%

Table 5. Two-way table of means for cabbage canopy diameter

CC (t/ha)	NPK (%)				
	0	25	50	75	100
0	45.2	62.8	72.7	72.3	72.7
15	56.8	72.5	76.4	76.0	77.3
30	58.7	71.0	77.0	79.0	83.7
45	70.2	77.0	76.2	77.0	80.0

Mean for poultry manure = 77.8 cm
Mean for poultry manure + NPK = 76.8 cm

Table 6. Correlation between cabbage canopy diameter, head diameter and yield

	Head diameter	Canopy diameter
Marketable yield	0.84	0.89
Head diameter	–	0.94

Table 7. Analysis of variance (ANOVA) for cabbage head diameter

Source	DF	Mean square	F value
Rep	2	4.76	1.30 ns
Compost	3	93.33	25.40***
Error (a)	6	0.708	–
NPK	2	405.78	110.42***
Compost x NPK	6	51.04	13.89***
Error (b)	16	3.67	–

Mean = 17.86; SE = 1.92; CV(%) = 10.74
***Significant at 0.1%; ns = Not significant

and cauliflower, CC application of 5% was sufficient. It is concluded that chrysanthemum compost can be recommended for seedling production.

Field studies

Canopy diameter Analysis of variance for canopy diameter showed significant effects of compost (CC), inorganic fertilizers (NPK) and CC x NPK interactions *(Table 4)*. The means for canopy diameter are presented in *Table 5*. At zero compost and NPK, the canopy diameter was only 45.2 cm. With the incorporation of 50% NPK, the canopy diameter increased by 61% to 72.7 cm. Generally at the higher rates of CC application, increasing NPK increased canopy diameter by a smaller quantum. For example at 15 t/ha CC + 50% NPK, canopy diameter increased by 35% compared to the 15 t/ha CC plot (56.8 cm to 76.4 cm). At 30 t/ha CC + 50% NPK, the diameter increase was 31% (58.7 cm to 77.0 cm). At 45 t/ha CC, the yield increase was only 8.5% (70.2 cm to 76.2 cm) when 50% NPK was added.

The positive correlation (0.89) obtained between canopy diameter and marketable yield *(Table 6)*, indicates the importance of achieving a good canopy diameter in cabbage, as it contributes positively towards yields, probably through increased leaf area for photosynthetic activity.

Head diameter As obtained for canopy diameter, analysis of variance for head diameter showed significant effects of CC, NPK and CC x NPK interaction *(Table 7)*. Means for head diameter are presented in *Table 8*. Like canopy diameter, increasing NPK rates at higher levels of CC gave a lower quantum of increase of head diameter. For example at 15 t/ha CC, head diameter increased by 65% (11.6 cm to 19.1 cm) when 50% NPK was added. At 30 t/ha CC, the increase in head diameter at 50% NPK was 38% (15.3 cm to 21.1 cm). And at 45 t/ha, the corresponding head diameter increase was only 19% (18.1 cm to 21.5 cm), indicating that higher rates of CC than 45 t/ha, might provide sufficient nutrients for growth, thus reducing the requirement for NPK to minimal or even zero. Chrysanthemum compost therefore shows

Table 8. Two-way table of means for cabbage head diameter (cm)

CC (t/ha)	NPK (%)		
	0	50	100
0	0	1.5	21.0
15	11.6	19.1	21.7
30	15.3	21.1	23.1
45	18.1	21.5	22.5

Mean for poultry manure = 22.7 cm
Mean for poultry manure + NPK @ 2 t/ha = 22.5 cm

Table 9. ANOVA for biological yield (t/ha) of cabbage

Source	Df	Mean Square	F value
Rep	2	782.09	25.09***
Compost	3	1 421.87	45.61***
Error (a)	6	50.43	–
NPK	4	3 765.76	120.80***
Compost x NPK	12	98.54	3.16**
Error (b)	32	31.17	–

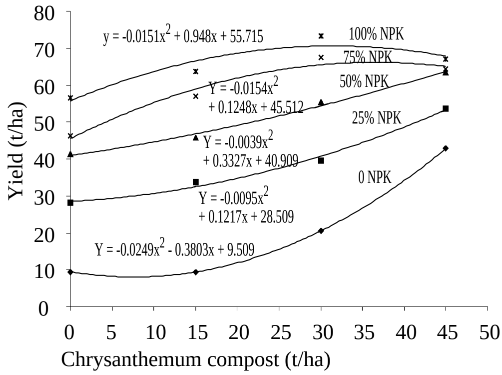
Mean = 46.9; SE = 5.58; CV(%) = 11.89
**Significant at 1%; ***Significant at 0.1%

potential as an organic nutrient source for plant growth.

A positive correlation (0.84), though lower than canopy diameter, was obtained between head diameter and marketable yield *(Table 6)*, indicating the importance of achieving sufficient head diameters for better yields.

Biological yield The analysis of variance for biological yield is presented in *Table 9.* Significant effects of replicates, compost rates, and NPK rates were obtained. The interaction effects between CC x NPK were also significant indicating that the response to NPK rates was variable, depending on the rates of CC applied.

Figure 1 shows the biological yield response trend to CC at various rates of NPK. As expected, higher yields were obtained when CC was incorporated with NPK compared to using only CC. At 0 CC + 0 NPK, biological yield obtained was only 9.50 t/ha. When no NPK was incorporated, increasing CC rate to 15 t/ha hardly increased yields, indicating that the nutrients



Control treatment yield
1. Poultry manure (PM) = 45.8 t/ha
2. PM + NPK = 77.8 t/ha

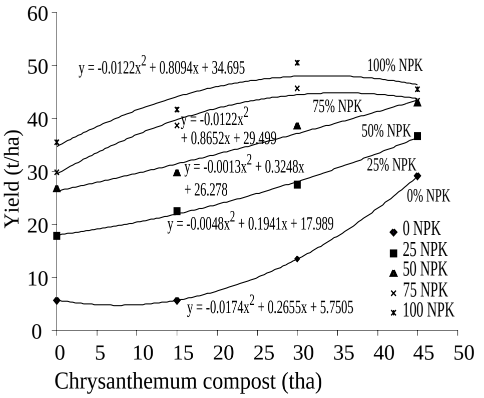
Figure 1. Cabbage biological yield

available were insufficient to boost yields. The increase in yields was significant at 30 t/ha CC (28.5 t/ha) and at 45 t/ha CC (42.9 t/ha). The biological yield obtained with compost (45 t/ha) as the sole source of nutrients was only 42.9 t/ha compared to a yield of 67 t/ha with 100% NPK.

The highest compost rate of 45 t/ha should theoretically provide 1 211 kg N, 450 kg P, 2 106 kg K, 1 260 kg Ca and 284 kg Mg *(Table 1)*. These are much more than the nutrient uptake by cabbages (Vimala and Joseph 1977) and should therefore be sufficient. The lower biological yield obtained with CC as the sole nutrient source is attributed to low availability of nutrients from the compost, probably even lower than the 30% N, 20% P and 50% K availability from manure, reported by Dierolf et al. (2001). Biological yield obtained from the control treatment (20 t/ha PM+ 2 t/ha NPK) was 78 t/ha. Yields of organic farms have been reported to be generally lower than those of conventional farms (Leclerc et al. 1991).

The highest rate of CC (45 t/ha) with the higher rates of inorganic fertiliser (75% and 100%) had a detrimental effect on biological yield. This may possibly be due to plasmolysis occurring because of the high concentration of nutrients in the rooting zone.

Marketable yield The analysis of variance for marketable yield is presented in *Table 10.* As obtained for biological yield, significant effects of replicates, compost, and inorganic fertilizer (NPK) were obtained. The interaction effects between compost rates x NPK rates were also significant. *Figure 2* shows the marketable yield response trend to CC at various rates of NPK. Without fertilizer, marketable yield was only 5.75 t/ha. Applying 15 t/ha CC hardly increased yields, again indicating the unavailability of the nutrients, to the growing plant. With CC as the sole source of nutrients at 30 t/ha, the yield increase was 134% (5.75 to 13.47 t/ha) and at 45 t/ha CC, the yield increase was 406% (5.75 to 29.1 t/ha). Roe et al. (1997) reported a yield increase of 88% for bell pepper when compost was increased from zero to 134 t/ha and Stoffella et al. (1996) reported a yield increase of 53% for bell pepper when compost was increased from zero to 134 t/ha. Stoffella and Graetz (1996) reported a tomato yield increase of 455% when compost was increased from zero to 224 t/ha.



Control treatment yield
1. Poultry manure (PM) = 31.4 t/ha
2. PM + NPK = 53.0 t/ha

Figure 2. Cabbage marketable yield

Table 10. ANOVA for marketable yield (t/ha) of cabbage

Source	Df	Mean Square	F value
Rep	2	477.52	30.47***
Compost	3	807.43	51.52***
Error (a)	6	31.33	
NPK	4	1 686.87	107.64***
Compost x NPK	12	46.02	2.94*
Error (b)	32	15.67	

Mean = 31.36; SE = 3.06; CV (%) = 12.62
*Significant at 5%; * **Significant at 0.1%

Generally, higher yields were obtained with CC + NPK compared to CC alone. It is, however, pointed out that at 45 t/ha CC as the sole nutrient source the yield (29.1 t/ha) was equivalent to that obtained from poultry manure alone (31.4). This indicates that CC has the potential of becoming an alternative organic fertilizer.

Though lower yields were obtained with CC and PM as the sole nutrient source, compared to CC + NPK and PM + NPK, in terms of profit, the higher price of organic produce would compensate for the lower yields obtained *(Table 11)*. For example, in this study, 45 t/ha CC as the sole nutrient source gave a yield of 29.1 t/ha while yields obtained with the control treatment (20 t/ha PM + 2 t/ha NPK) was 53 t/ha. Assuming a CC price of RM600/t, 45 t of CC would cost the organic grower RM27 000. His gross income from 29.1 t/ha yield, at an assumed price of RM3/kg for organic cabbage, would be RM87 300. His income would be RM60 300 after deducting the cost of compost. The control treatment would cost the grower only RM6 400 for fertilisers (RM200/t for PM and RM1 200/t for inorganic fertilizer). However, his gross

Table 11. Estimate of costs and returns

Fertiliser treatments	Yield (t/ha)	Fertiliser cost (FC)	RM/kg yield	Gross income (GI)	GI – FC
CC 45 t/ha	29.1	27 000	3.00	87 300	60 300
PM 20 t/ha + 2 t/ha NPK	53.0	6 400	1.00	53 000	46 600
PM 40 t/ha	31.4	8 000	3.00	94 200	86 200

income from the 53.0 t/ha yield at RM1.00/kg would be only RM53 000 or RM46 600 after deducting the cost of fertiliser. This is RM13 700 less than if he had used 45 t of CC as the sole nutrient source to produce organic cabbage.

The price of the organic produce in Malaysia is generally more than twice the inorganic produce (Khoo 1999). In fact, at present, higher returns can be expected, as some organic farms sell vegetables at RM4 – RM6/kg. Elsewhere, however, price premium for organic produce is reported to range between 20 – 40% above conventional prices (FAO 2001).

Chrysanthemum residue compost can be considered as an effective organic fertilizer, comparable to PM as an organic nutrient source. Previous studies on a range of organic fertilizers did not identify a suitable alternative to poultry manure (Vimala et al. 2001; Vimala et al. 2002; Vimala, Mah, Roff, Ong et al. 2000; Vimala, Mah, Roff, Wan Rubiah et al. 2000).

Table 12. ANOVA for harvest index of cabbage

Source	DF	Mean square	F Value
Rep	2	0.015	2.55 ns
Compost	3	0.039	6.66**
Error (a)	6	0.008	–
NPK	4	0.029	4.90**
CC x NPK	12	0.014	2.38*
Error (b)	32	0.006	–

Mean = 0.64; SE = 0.076; CV(%) = 11.84
*Significant at 5%;
**Significant at 1%; ns = Not significant

Table 13. Two-way table of means for harvest index of cabbage

CC (t/ha)	NPK (%)				
	0	25	50	75	100
0	0.306	0.626	0.649	0.646	0.627
15	0.596	0.670	0.655	0.677	0.651
30	0.648	0.693	0.698	0.671	0.684
45	0.679	0.681	0.677	0.672	0.679

Mean for poultry manure + NPK = 0.680
Mean for poultry manure = 0.683

Harvest index As obtained for yields, significant effects of CC, NPK and NPK x CC interactions were obtained for harvest index *(Table 12)*. Means for harvest index are presented in *Table 13*. The harvest index increased from 0.31 at zero fertilizer to a maximum of 0.70 when 30 t/ha CC + 50% NPK was used. The harvest index for cabbage was generally higher than that obtained for other crops in Malaysia (Tan 1998; Vimala and Salbiah 2000).

Nitrate content The nitrate contents of cabbage heads from selected treatments are presented in *Table 14*, both on dry weight basis and fresh weight basis. Though results were quite variable, CC as the sole nutrient

Table 14. Nitrate content of cabbage heads

Treatments	NO_3 (ppm) (Dry weight basis)	NO_3 (ppm) (Fresh weight basis)
0 CC + 100% NPK	1 142abc	60
15 CC + 0 NPK	0c	0
15 CC + 50% NPK	141c	7
30 CC + 0 NPK	0.3c	0.02
30 CC + 50% NPK	1 025bc	54
30 CC + 100% NPK	932c	49
45 CC + 0 NPK	230c	12
45 CC + 50% NPK	2 399a	126
45 CC + 100% NPK	2 295ab	121
Poultry manure	1 289abc	68
Mean	945	
Significance	**	
CV%	70.1	

Mean values with the same letters are not significantly different
**Significant at 1%

Table 15. Heavy metal contents in cabbage head

Treatments	Heavy metal contents (ppm)		
	Cd	Pb	As
0 CC + 100% NPK	0.063	0.863	0.120
30 CC + 0 NPK	0.034	0.732	0.158
45 CC + 0 NPK	0.042	0.307	0.148
45 CC + 100% NPK	0.043	0.779	0.133
PM	0.041	0.610	0.168
Mean	0.045	0.658	0.145
Significance	ns	ns	ns
CV(%)	44.9	43.7	25.6

ns = Not significant
Mean values with the same letters are not significantly different

Table 16. Crude fibre content in cabbage head

Treatment	Crude fibre content
0 CC + 100% NPK	11.26
45 CC	10.51
PM	9.25
Mean	10.34
Significance	ns
CV%	22.7

source gave much lower nitrate contents compared to CC + NPK. Compost also gave lower nitrate contents compared to PM and 100% NPK. The nitrate values obtained for all the treatments were below the safe limit (Splittstoesser and Vandermark 1974).

Heavy metal content Cadmium, lead and arsenic contents are presented in *Table 15*. All the heavy metal contents were below the permissible limits of 1 ppm Cd, 2 ppm Pb and 1 ppm As (Legal Research Board 1997). There were no significant differences between treatments. It is concluded that neither CC nor poultry manure nor inorganic fertilizers at the rates used in this study contributed to heavy metal accumulation to unsafe levels.

Crude fibre content The crude fibre content (a measure of eating quality) of cabbage heads from selected treatments are presented in *Table 16*. No significant differences were obtained.

Conclusion

Chrysanthemum compost (CC) is an effective organic nutrient source for the raising of seedlings as well as for the cultivation of vegetables. The interim recommended rate of CC as the sole nutrient source for cabbage is 45 t/ha. Though yields with CC alone were lower than either with CC + NPK or PM + NPK, profitable returns are possible because of premium prices that organic produce command. Chrysanthemum compost can also be recommended as an alternative to poultry manure in conventional vegetable cultivation. Yields (50.5 t/ha) obtained with 30 t/ha CC + 2 t/ha NPK was comparable to yields (53.0 t/ha) obtained from 20 t/ha PM + 2 t/ha NPK. Though CC would cost the grower more than PM, CC has potential because it does not have the foul odour, fly menace and the speculated health risks associated with PM.

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Abstrak
Matlamat utama kajian ini adalah untuk menilai keberkesanan kompos kekwa (CC) sebagai baja organik untuk pertumbuhan anak benih dan penanaman kubis di kawasan tanah tinggi. Kompos tersebut dihasilkan daripada sisa tanaman kekwa. Kajian di dalam rumah kaca menunjukkan biomas kering anak benih (kubis cina, kubis bunga, salad, tomato dan bunga kekwa) setanding atau lebih baik berbanding dengan dua medium yang lain.

Kompos kekwa telah diuji di ladang pada kadar 0, 15, 30 dan 45 t/ha dan digabungkan dengan baja tak organik (NPK) pada kadar 0, 25, 50, 75 dan 100% (2 t/ha). Hasil yang ketara diperoleh dengan penggunaan CC dan NPK. Tindak balas yang ketara antara CC dengan NPK juga diperoleh. Hasil kubis bertambah sebanyak 133% [daripada 5.8 t/ha (tiada baja langsung) kepada 13.5 t/ha] apabila CC sahaja digunakan pada kadar 30 t/ha. Apabila 45 t/ha CC digunakan, hasil yang setanding (29.1 t/ha) diperoleh dengan baja tahi ayam (31.4 t/ha). Hasil tertinggi (50.5 t/ha) diperoleh pada kadar 30 t/ha CC + 2 t/ha NPK. Hasil ini setanding dengan hasil kawalan dengan kadar baja 20 t/ha tahi ayam + 2 t/ha NPK (53 t/ha). Walaupun hasil penggunaan baja organik kurang jika dibandingkan dengan hasil kombinasi baja organik + baja kimia, pulangan kepada petani organik masih tinggi kerana harga sayur-sayuran organik di pasaran masih tinggi.

Sebagai kesimpulan, CC boleh diguna sebagai punca nutrien organik untuk menanam sayur-sayuran dan untuk tumbesaran anak benih.

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