Original Paper

The effect of different doses application of dry granulated vermicompost on yield parameters of maize and potatoes

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Both pilot experiments were carried out in the district of Veľký Krtíš. The experiment with maize was realized on loamy Luvisol (cadastre Opatovská Nová Ves), characterized by a medium N_{an}, conforming P, good K content and neutral pH. The experiment with potatoes was realized on loamy Fluvisol (cadastre Malá Čalomija) characterized by a medium N_{an}, very low P, good K content and neutral pH. The experimental site has a warm climate, with the warm and dry subarea and with mild winters. In the experiment with maize grown for grain were 4 treatments established – a control treatment and three treatments with dose increasing of granulated vermicompost (4.6; 9.2; 11.6 t ha^{-1}, respectively), which supplied 57, 114 and 142 kg ha^{-1} total nitrogen to the soil, respectively. The experiment was not irrigated. The experiment with potatoes included 7 treatments of fertilization. The first treatment was a control treatment, i.e., without the appliance of dry granulated vermicompost. In treatment 2 to 6 increasing doses of vermicompost (3.3; 6.6; 9.9; 13.2 and 19.8 t ha^{-1}, respectively) were applied. Through the following doses of granulated vermicompost were applied to the soil 40, 80, 120, 160, 240 kg ha^{-1} N. Not only was the granular vermicompost applied in treatment 7, but also the industrial NPK fertilizer (150 kg urea + 200 kg ha^{-1} NPK 15-15-15). The pre-sowing application of granulated vermicompost was significantly influenced the grain yield of maize, starch content in the grain, a thousand kernel weight and content of five observed macroelements (N, P, K, Ca, Mg). The grain yield was increased with the dose increasing of vermicompost. A thousand kernel weight, starch content and magnesium content parameters with the increasing dose of vermicompost were reduced. A dose of 4.6 t ha^{-1} vermicompost seems like the most appropriate for the parameters of a thousand kernel weight, starch and magnesium content. The increasing doses of vermicompost significantly increased the yield of potato tubers, starch content and dry matter content in tubers. The application of granulated vermicompost reduced vitamin C content in potato tubers. The use of fertilizers resulted to increasing the nitrate content in potato tubers however the application of granulated vermicompost has increased the contents of nitrates to a lesser extent than the joint application of NPK fertilizer and granulated vermicompost.

Keywords: granulated vermicompost, maize, potatoes, starch, vitamin C

1. Introduction

The decrease of production of organic fertilizers, which started in Slovakia in the 1990´s, has currently negatively manifested in several biological, chemical and physical parameters of the soil. In many soils the content of mobile phosphorus and potassium has decreased (Gáborik, 2006), the content of plant growth regulators, organic chelating agents and organic substances, which are involved in the formation of humus, has also decreased (Kováčik and Halčínová, 2010). The ability of the soil to resist sudden changes of pH and the sorption capacity of the soils has decreased (Fecenko and Ložek, 2000). The bulk density of the soil has increased, water infiltration into the soil has worsened and the negative effects of water erosion have increased. The air regime of the soil has worsened and the heat capacity of the soils has decreased. The soil fatigue has increased (Lacko-Bartošová, et al., 2005). The microbial life diversity in the soil was reduced, which in some locations caused retardation of the decomposition of crop residues infected by pathogens and resulted in an increased need for pesticide applications. Less relatively stable organic bonds with heavy metals are created, which has resulted in increasing penetration of metals into the food chain. All these things resulted in the reduction of yield grown plants in companies with the lack of financial resources to buy direct and indirect fertilizers. In many cases the lack of their own, but also the lack of quality and affordable purchased organic fertilizers, resulted in increasing the number of cases of poor quality manure applications, and as a result does not only negatively influence the height and quality of yield, but when it is used at the wrong time and dose, it also has a negative impact on the environment.

Less attention is devoted to the technologies of processing by-products of plant and animal production, organic and inorganic waste materials from different industries in Slovakia than in the surrounding countries. The result is a number of products produced on the basis of these substances, whose effectiveness varies significantly

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as a result of failure to comply with production technology, but also inaccurate definitions of the active ingredient.

The use of organic fertilizers and crop residues in crop production has been a known activity for hundreds, even thousands of years (Lacko-Bartošová et al., 2005), thanks to new varieties, changing climatic conditions, new aims in cultivation (higher yields, better quality, maximum efficiency of production), new technologies of food processing and efforts for nature protection and sustainable agriculture, these „old" materials and new technologies are nowadays a target of refinement and globally focused attention (Eghball, 2002; Sharpley et al., 2004; Welke, 2005). For these reasons, the presented experiment shows the impact of dry compost on potato and maize yield parameters.

2. Material and methods

Effect of spring application of granulated vermicompost (GV) on yield parameters of maize (variety Stira) and tubers of potatoes (variety Sorento) was assessed in a pilot experiment in the district of Veľký Krtíš. Granulated vermicompost was produced from sheep manure and leaf litter (agrochemical parameters are given in Table 1). Experimental area had 5.4 hectares and 3.0 hectares.

The experimental territory belongs to the warm climate, to a warm and dry subarea and to a warm and dry district with a mild winter. Average annual rainfall is 635 mm, while in the production year in 2011, it was only 355 mm (extremely dry year). In the period from the 28th of March to the 23rd of April and from the 9th of August to the 8th of October rainfall has not reached even 2.5 mm and it was indicative of a very dry, unfavourable agricultural year.

The maize was grown on loamy Luvisol (cadastre Opatovská Nová Ves) which was characterized by a moderate Nan, a conforming content of available P, good content of available K and a neutral pH (Table 2). The potatoes were grown on loamy Fluvisol (cadastre Malá Čalomija) which was characterized by a moderate N_{an}, very low content of available P, good content of available K and a neutral pH (Table 2). The agrochemical soil parameters on which the experiments were carried out are shown in Table 2.

For the determination of the soil parameters and vermicompost, the following analytical methods were used: $N\text{-}NH_4^+$ – colorimetrically using Nessler reagent and $N\text{-}NO_3^-$ – colorimetrically with acid phenol 2.4-disulfonic while extract of soil was obtained using an aqueous solution of 1% K_2SO_4 and extract from the compost with distilled water. $N_{an} = N\text{-}NH_4^+ + N\text{-}NO_3^-$ (Kováčik, 1997). Available P – colorimetrically by Mehlich III. K and Ca contents with flame photometry according to Mehlich III were determinate. Available Mg – atomic absorption spectrometry (AAS) by Mehlich III (Mehlich, 1984). Total carbon content (C_{ox}) according to a Tyurin method in a modification by a Nikitin method (Ťjurin, 1966) was determined. Organic substances (Org. s.) with gravimetric method (annealing at 550 to 600 °C) were determined (Kováčik, 1997). Total nitrogen content (N_t) – distillation (Kjeldahl and Bremner, 1960) modifications for soil and organic substrates were determined as well (Kováčik, 1997). pH_{H2O} (distilled water) and pH_{KCl} (solution of 1.0 mol KCl dm^{-3}) was determined potentiometrically.

In the experiment with maize 4 treatments were established (Table 3). A control treatment and three treatments with dose increasing of granulated vermicompost (4.6; 9.2; 11.6 t ha^{-1},respectively) which gave the soil 57, 114 and 142 kg ha^{-1} total nitrogen, respectively. Doses of vermicompost were calculated based on the difference between the nitrogen requirements of the planned 6 ton yield of maize grain (150 kg ha^{-1}) and the content of inorganic nitrogen in the soil layer from 0.0 to 0.3 m. Low, 6 ton grain yield of maize was planned because the farmer on the land in this area isn´t achieving higher yields than 6 t ha^{-1} of grain. The experiment was not irrigated.

The application of granulated vermicompost was made in the spring once, ten days before sowing the maize. The harvest of maize was made with a six-row harvester. Maize from each treatment was taken away to the dryer, where it was weighted and the water content was determined. In the maize grain, N, P, K, Ca, Mg contents and TKW (thousand kernel weight), starch content with following methods were determined: N – distillation – Kjeldahl method

Table 1 Agrochemical parameters of vermicompost intended for the production of maize (100% dry matter)

$N\text{-}NH_4^+$	$N\text{-}NO_3^-$	N_{an}	P	K	Ca	Mg	C_{ox}	Org.s.	N_t	pH/H_2O	Dry matter
mg kg^{-1}							%		mg kg^{-1}		%
536.8	977.1	1,513.9	2,817	11,949	7,846	3,268	16.86	33.43	15,248	7.33	80.34

Table 2 Agrochemical characteristics of soil for the cultivation of maize and potato (100% dry matter)

Soil/plant	$N\text{-}NH_4^+$	$N\text{-}NO_3^-$	N_{an}	P	K	Ca	Mg	N_t	C_{ox}	Org.s.	pH_{KCl}
	mg kg^{-1}								%		
Maize	7.8	5.25	13.05	70	213.8	1 750	325	1,449	1.49	5.02	6.22
Potatoes	5.9	6.25	12.15	16.25	182.5	3 250	354	1,302	1.25	4.62	7.05

Table 3 Treatment of maize experiment

Treatment		Dose of fertilizer	Dose of nitrogen
Number	labelling	t ha^{-1}	kg ha^{-1}
1	0	0	0
2	GV_1	4.6	57
3	GV_2	9.3	114
4	GV_3	11.6	142

Table 4 Treatment of potatoes experiment

Treatment		Dose of fertilizer	Dose of nitrogen
Number	labelling	t ha^{-1}	kg ha^{-1}
1	0	0	0
2	GV_{40}	3.3	40
3	GV_{80}	6.6	80
4	GV_{120}	9.9	120
5	GV_{160}	13.2	160
6	GV_{240}	19.8	240
7	GV_{36} + N_{99} + P + K	3.0	36 + 99 = 135

after mineralization in concentrated H_2SO_4 (Cohen, 1910), P – spectrophotometrically (Koppová et al., 1955), after mineralization using HNO_3 and $HClO_4$, K and Ca – flame photometry (Koppová et al., 1955), after mineralization using HNO_3 and $HClO_4$, Mg – atomic absorption spectrophotometry (Koppová et al., 1955), after mineralization using HNO_3 and $HClO_4$ and starch – Ewers polarimetric method (STN 46 1011-37, 2003).

The experiment with potatoes had 7 treatments (Table 4). The first treatment was controlled, i.e., without applying of dry granulated vermicompost. In treatments 2 to 6, increasing doses of vermicompost were applied (3.3; 6.6; 9.9; 13.2 and 19.8 t ha^{-1}, respectively). Through the following doses of granulated vermicompost were applied to the soil 40, 80, 120, 160, 240 kg ha^{-1} N. In treatment 7, not only granulated vermicompost was applied, but also industrial NPK fertilizer (150 kg urea + 200 kg ha^{-1} NPK 15-15-15).

The crop of potatoes was irrigated 3 times during the vegetation with a single dose of 35 l m^{-2} (35 mm). In early June, at the height of crop of about 15 to 20 cm, herbicidal spraying with the Sencor preparation at a dose of 250 g ha^{-1} was carried out. It significantly damaged the leaf apparatus, which was reflected in a lower total yield of potatoes, which was average at 21.5 t ha^{-1}.

The fertilization was made in two stages. The week before planting at 3.0 t ha^{-1} for the entire field, and the rest (0.3; 3.6; 6.9; 10.2 and 16.5 t ha^{-1}) of the month before the first covering of potatoes. Application of granulated vermicompost before planting potatoes has been realized with harrowing. The second application of GV was performed in the way of spreading compost on the soil surface, and then, the compost was shallowly ploughed into the soil when potatoes were being covered up. The harvest of potato tubers was made by hand using a two-line digger. The harvested potatoes were weighed in bags directly in the field. The following parameters in the potato tubers were determined: N – distillation – Kjeldahl method after mineralization in concentrated H_2SO_4 (Cohen, 1910), NO_3^- – ion-selective electrode Crytur (Hubaček and Bernatzik, 1979), starch – Ewers polarimetric method (STN 46 1011-37, 2003), vitamin C with titration 2.6 dichloro-fenolindofenol (extract in 5 % trichloroacetic acid).

Achieved results were evaluated by analysis of variance (LSD test) using computer program Statgraphics, version 5.

3. Results and discussion

3.1 The experiment with maize

The data presented in Table 5 shows that the sowing application of solid, granulated vermicompost has significantly influenced the grain yield of maize, the starch content in the grain, a thousand kernel weight and the five monitored macroelements content (N, P, K, Ca, Mg).

The dose increasing of vermicompost has increased the yield. The difference in yields between the control treatment 0 and the treatment (tr.) GV_1, respectively, between treatment 0 and treatment GV_2 were not statistically significant, but application of 11.6 t ha^{-1} of granulated vermicompost (tr. GV_3 – Table 3) statistically significantly increased grain yield, not only in relation to the control treatment, but also in relation to other treatments (Table 6). Positive, though small maize response to increasing doses of granulated vermicompost (with the exception of the treatment where 142 kg ha^{-1} were delivered via vermicompost), was caused by spring application of granulated vermicompost in conditions characterized by low rainfall, while the soil was not additionally irrigated, and by planting outdated varieties, i.e. non-utilization of the genetic potential of new maize varieties, responding well to moderate and high doses of nutrients.

A positive find is that the applying of granulated vermicompost was positive and significantly influenced starch content in maize grain, because the usually dose increasing of the N causes the starch content in the maize grain and cereals as well as root crops to decrease (Fecenko and Ložek, 2000). The lowest content of starch was found in the control, non-fertilized treatment and the highest in the treatment with the lowest application dose of granulated vermicompost (Table 6). A significantly positive impact of vermicompost on the content of starch and a relatively little effect on grain yield indirectly points to relatively lower utilization of nitrogen from the vermicompost to produced yield, which is not a positive find. This hypothesis is also confirmed by the observed N content in maize grain. With the rise of the application dose of granulated vermicompost

Table 5 The impact of resources of variability on maize yield parameters

Resources of variability	n	Yield	Starch	TKW	N	P	K	Ca	Mg
		F-calculated							
Treatment	3	18.239^{++}	16.526^{++}	10.166^{++}	34.904^{++}	35.771^{++}	18.971^{++}	13.636^{++}	44.514^{++}
Repetition	3	0.674	0.619	1.326	0.710	0.819	1.11	1.364	0.462
Rest	9								
All	15								

n – degrees of freedom

Table 6 The impact of application of granulated vermicompost on yield parameters of maize

Treatment		GV	N	Yield	Starch	TKW	N	P	K	Ca	Mg
Number	labelling	t ha^{-1}	kg ha^{-1}	t ha^{-1}	%	g	mg kg^{-1}				
1	0	0.0	0	5.91 a	61.83 a	291.0 a	16,636 c	3,062 a	3,209 ab	823 c	1965 a
2	GV1	4.6	57	5.95 a	64.57 b	322.3 b	15,835 b	3,353 b	3,393 c	821 bc	2,668 c
34	GV2	9.3	114	6.10 a	64.07 b	299.7 a	15,505 b	3,337 b	3,178 a	817 a	2,496 b
46	GV3	11.6	142	6.56 b	63.88 b	285.3 a	15,009 a	3,350 b	3,263 b	820 b	2,370 b
$LSD_{0.05}$				0.223	0.948	16.31	370.21	76.15	69.81	2.16	143.52
$LSD_{0.01}$				0.320	1.363	2.43	531.83	109.40	100.29	3.11	206.17

$LSD_{0.05}$ – least significant difference test at 95% level of significance (LSD – test)

Table 7 Dependence of starch in maize grain from the contents of macroelements in the grain expressed with correlation coefficient (*r*)

Parameter		Correlation coefficient (*r*)
Dependent	independent	
Starch content in maize grain	N in maize grain	0.5973^{+}
	P in maize grain	0.8066^{++}
	K in maize grain	0.5750^{+}
	Ca in maize grain	-0.4279
	Mg in maize grain	0.8750^{++}

(GV), nitrogen content was decreases. Between grain yield and nitrogen content of the grain is a negative correlation (r = -0.6717^{++}), which points to the fact that the chosen dose of vermicompost has not loosened such an amount of inorganic N, that would increase the nitrogen content of the grain. If this would have been found after using the industry N fertilizer, it would be rated positively, as a maximum utilization of nitrogen for yield production. In this case it indicates the fact that in the used vermicompost, there is a relatively low dose of easy degradable nitrogen compounds and the dose of vermicompost must be higher to significantly increased yield, or that its use must be carried out in the autumn if an farmer is planting his crops in a region, which has low rainfall and irrigation is not available. If the farmer has irrigation available, or farmers in a region with insufficient rainfall, then he can apply the GV in the spring before sowing crops. The impact of granulated vermicompost on the thousand kernel weight of maize corresponds to its impact on starch content. Highest TKW was found in the treatment with the lowest application dose of vermicompost, while with the dose increasing of GV, the thousand kernel weight and the starch content were decreased. The use of a granulated vermicompost significantly increased phosphorus and magnesium in maize grain.

Our results presented in Table 7 indicate a positive correlation between the increase of nitrogen, phosphorus, potassium and magnesium in grain with the increase of the starch content of maize grain. On the other hand, it has been reported inconclusive negative correlation between the content of Ca and starch in the grain. With increasing doses of nitrogen fertilizer generally starch content in the cereals grain decreases (Miao, 2006; Sharma and Arora, 1988). On the other hand, Srikumar and Öckerman (1990) submit that the increasing of application doses of NPK fertilizer has increased the starch content in potatoes. Masoero et al. (2011) in their experiment was not showed the effect of different application doses of nitrogen to change the starch content of maize grain. Authors Li et al. (2013) indicate that NH_4^+ nitrogen is responsible for the increased accumulation of starch in the grain of maize. In our experiment, we found a positive correlation between nitrogen and starch content in grain, which confirms the conclusions of the authors Srikumar and Öckerman (1990). Sharma and Arora (1988) indicate that the application of phosphate fertilizers leads to a significant increase in starch content in potato tubers. The same results are also shown by our experiment with maize, where we also recorded highly significant positive correlation between starch and phosphorus content in maize grain. With the increasing of potassium content, the starch content in maize grain was increased. Sharma and Arora (1988) stated that the application of potassium fertilizers significantly increased starch content in potato tubers. Liu et al. (2011) observed a negative correlation between the concentration of K^+ and Ca_2^+ in root exudates and starch content in grain in the experiments with rice. Reid (2002) has found out through experiments with maize, that delivery of magnesium through fertilizer has no effect on yield if the soil has a good supply of magnesium. On the other hand, the lack of magnesium in the form of Mg_2^+ leads to reduced starch in storage tissues such as in cereal grain or tuber root crops (Marschner, 1995; Mengel et al. 2001). In our experiment, was recorded high significant correlation coefficient between magnesium content and starch content in the grain of maize, so we identify with the conclusions of the authors Marschner (1995) and Mengel (2001).

3.2 The experiment with potatoes

The impact of the application of granulated vermicompost on potato tubers yield parameters is shown in Table 8. From Table 8 is evident that the increasing doses of vermicompost have significantly increased tuber yield. Similarly, positive effects of vermicompost on yield grown plants were recorded by Gorodnij (1989) and Atiyeh et al. (2000), which show in some cases an up to 48 % increase in yield.

Table 8 The impact of dry vermicompost application on yield parameters of potatoes

Treatment		Yield of tubers		Average weight of tubers		Dry mass	
Number	labelling	t ha^{-1}	rel. %	g	rel. %	%	rel. %
1	0	18.37 a	100.00	76.33 b	100.00	22.17	100.00
2	GV 40	18.93 b	103.05	73.08 a	95.74	22.59	101.89
3	GV 80	19.40 b	105.61	88.56 c	116.02	23.89	107.76
4	GV 120	22.88 c	124.55	88.82 c	116.36	21.58	97.34
5	GV 160	24.10 d	131.19	93.22 d	122.13	24.58	110.87
6	GV 240	25.57 e	139.19	101.95 f	133.56	22.77	102.71
7	GV_{36} N_{99} + P + K	27.69 f	150.73	95.18 e	124.70	23.53	106.13
$LSD_{0.05}$		0.5257	–	1.163	–	–	–
$LSD_{0.01}$		0.7369	–	1.630	–	–	–

$LSD_{0.05}$ limit of significant difference at the level = 0.05

Table 9 The impact of granulated vermicompost application on quality parameters of potatoes

Treatment		NO_3^-		Vitamin C		Starch		N-total	
Number	labelling	mg kg^{-1}	rel. %	mg 100 g^{-1}	rel. %	%	rel. %	mg kg^{-1}	rel. %
1	0	72.33 bcd	100.00	6.25 c	100.00	15.44 ab	100.00	15,337 cd	100.00
2	GV_{40}	66.00 abc	91.25	6.15 bc	98.40	16.98 ab	109.97	14,775 bc	96.34
3	GV_{80}	86.33 cd	119.36	5.02 a	80.32	16.15 ab	104.60	16,083 de	104.86
4	GV_{120}	52.67 ab	72.82	5.00 a	80.00	14.96 a	96.89	16,492 e	107.53
5	GV_{160}	48.33 a	66.82	5.01 a	80.16	15.97 ab	103.43	14,567 b	94.98
6	GV_{240}	88.00 cd	121.66	5.61 b	89.76	16.74 ab	108.42	13,181 a	85.94
7	GV_{36} N_{99} + P + K	94.67 d	130.89	5.61 b	89.76	17.08 b	110.62	13,641 a	88.94
$LSD_{0.05}$		22.902	–	0.572	–	2.095	–	765.06	–
$LSD_{0.01}$		32.106	–	0.802	–	2.937	–	1,072.52	–

$LSD_{0.05}$ limit of significant difference at the level = 0.05

In our experiment, the potato tuber yields were increased at intervals of 3 to 39 %. Despite an expressly confirmed positive effect of granular vermicompost to potatoes harvest, the effect of 240 kg total N (tr. 6) doesn´t equal to the effects of 99 kg of inorganic nitrogen supplied in fertilizers and 36 kg of total nitrogen supplied in granulated vermicompost (tr. 7), as consequence of the fact that in treatment 6, only about 26 kg of inorganic nitrogen were applied. A significantly higher efficiency of the industrial N fertilizer than the farm N fertilizer is a phenomenon that is characteristic for all farm (organic) fertilizers in those cases, where through the application of organic fertilizers, less than 50 % N_{an} is supplied, compared with industrial fertilizers.

With the increasing of application doses of vermicompost, except the treatment in which the lowest dose was applied, the average weight of tubers was increased. In the treatment with a high-dose of vermicompost, the average weight of a tuber was 101.95 grams, which is a welcome weight from a commercial standpoint (about 10 tubers per kilogram). Potato tubers in this treatment were significantly higher not only in relation to other treatments of fertilization with lower doses of GV, but also in relation to tubers of treatment 7, where a decisive part of N was supplied via industrial fertilizers.

Nitrogen fertilization, in most cases, has increased the yield of vegetables through an increase of the water content, rather than the dry matter content in vegetables (Kováčik, 2002). In the presented experiment the used granular vermicompost increased dry matter content of potatoes by 1.89 % to 10.87 %, an exception was observed in treatment 4. The find points out that the increase in the yield is not implemented by increasing the water content, but by increasing the content of organic matter, which is a positive conclusion not only for qualitative reasons, but also for storage reasons of potatoes.

With the rise of the N application dose, the nitrate content in vegetables is usually increased, vitamin C and starch content is decreased (Kováčik et al., 2011). Through our results, these findings for nitrate were confirmed only partially (Table 9). In the case of vitamin C, they were completely in agreement, and in the case of starch content, with one exception, they were entirely contradictory.

The vitamin C content was highest in the control, non-fertilized treatment. Fertilization only with granulated vermicompost with industrial NPK fertilizer significantly reduced the content of vitamin C. The exception was treatment 2, where a drop of vitamin C was not significant due to the low application dose of nitrogen by fertilizers.

The impact of nitrate fertilizer in relation to the control treatment was unbalanced. In some cases the content of nitrate was increased and in some reduced. The highest nitrate content in tubers was in the treatment where critical part of N was supplied with industrial fertilizers. That finding is consistent with the data presented by Lacko-Bartošová et al. (2005) who recorded a significant increase of nitrate content when industrial fertilizers were used, such as the use of organic N fertilizers.

The starch content in potato tubers was positively influenced through an independent application of granular vermicompost (with one exception – tr. 4, Table 9) and also through a common application of industry NPK fertilizers. It was increased.

4. Conclusions

The pre-sowing application of granulated vermicompost has increased grain yield, starch content in maize grain and the content of available phosphorus and magnesium in the grain. With the rising application dose of compost, grain yield was increased, but statistically significant increase in yield was observed only at the highest application dose of compost (11.6 t ha^{-1}). Parameters of the thousand kernel weight, starch and magnesium content were reduced with an increasing dose of vermicompost.

An escalated dose of granulated vermicompost applied before the planting of the potatoes in the spring significantly increased tuber yield. The increases were in intervals from 3 to 39 %. With the rise of the application dose of granulated vermicompost, the average weight of tubers usually increased. The average weight of tubers in one variant with high-dose of vermicompost was about 102 g, which is a welcome weight from a commercial standpoint (about 10 tubers per kilogram). The use of granulated vermicompost has tended to increase dry matter content of potatoes, which is a positive find, not only in terms of the quality of potatoes, but also in terms of their storage. The starch content in potato tubers was positively influenced through the independent application of granulated vermicompost (with one exception) and also through the common application with industry NPK fertilizers. It was increased. The use of fertilizers resulted in an increase of the nitrate content in potato tubers, but the application of granulated vermicompost was increased to a lesser extent than the joint application of industrial fertilizer and granulated vermicompost.

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