

Yield and quality of field grown vegetables fertilized with ammonium based fertilizers containing the nitrification inhibitor DMPP (ENTEC®)



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Introduction

Nitrification inhibitors (NI) delay the oxidation of ammonium to nitrate in soils for a certain period of time. Known agronomic and environmental advantages of NI applied together with ammonium based fertilizers can be seen on the poster of Zerulla et al. .

DMPP (3,4-Dimethylpyrazol phosphate) is a newly approved nitrification inhibitor in many European countries since the year 2000. ENTEC® is the registered trademark of COMPO GmbH & Co KG, Münster, Germany for DMPP and all DMPP containing fertilizers.

Yield

On average yield increases with DMPP about 10 %

Crop	No. of trials	Marketable Yield (dt/ha)						
		without fertilizer	N fertilization level suboptimal			N fertilization level optimal		
			without DMPP	with DMPP	% difference to without DMPP	without DMPP	with DMPP	% difference to without DMPP
Broccoli	3	22 a	143 b	129 b	- 10	126 b	137 b	+ 9
Brussels sprout	1	142 a	253 b	304 bc	+ 20	330 c	318 c	- 4
Carrots	6	657 a	825 b	863 b	+ 5	844 b	845 b	0
Cauliflower	9	193 a	345 b	361 ¹⁾ bcd	+ 5	381 cd	394 ¹⁾ cd	+ 3
Celeriac	6	413 a	698 bc	717 cd	+ 3	708 bcd	757 e	+ 7
Chinese cabbage	6	138 a	770 b	819 ¹⁾ c	+ 6	879 bc	952 ¹⁾ d	+ 8
Head cabbage	4	535 a	998 b	966 ¹⁾ bc	- 3	951 bc	997 ¹⁾ cd	+ 5
Kohlrabi	5	109 a	427 b	476 c	+ 13	513 c	513 c	0
Lambs lettuce	16	12 a	54 b	84 d	+ 55	60 c	90 d	+ 50
Leek	8	364 a	446 b	454 b	+ 2	448 b	479 c	+ 7
Lettuce	24	119 a	371b	391 c	+ 6	423 c	425 c	0
Onions	8	494 a	648 b	645 c	0	654 b	680 c	+ 4
Radish	3	114 a	256 b	302 c	+ 18	299 c	321 c	+ 7
Weighted mean					+ 12			+ 11

¹⁾ only one fertilizer application

Between 1998 and 2002 a total of 95 field trials with vegetables were conducted in Central Europe with ASN/ NPK in comparison to ASN/ NPK + DMPP (ENTEC) at an optimal N level and with 75 % of the optimal N level .

External quality

Darker green locking plants and more homogeneous crops are often observed features of vegetables fertilized with DMPP



Pronounced effects can be observed in most of the crops, e.g. with celeriac .

Internal quality

Tendency of lower nitrate content in edible plant parts after fertilization with DMPP

Crop	No. of trials	Nitrate contents [mg/kg fresh weight]			
		w without fertilizer	fertilizer without DMPP	fertilizer with DMPP	% difference to without DMPP
Broccoli	3	25	80	100	+ 25
Cauliflower	9	118	145	83	- 43
Carrots	6	15	52	27	- 48
Celeriac	5	228	449	393	- 12
Chinese cabbage	6	640	1120	956	- 15
Head cabbage	4	201	258	176	- 32
Kohlrabi	5	114	378	312	- 18
Lambs lettuce	16	50	503	629	+ 25
Leek	8	46	101	106	+ 5
Lettuce	24	432	839	877	+ 4
Radish	3	696	1480	1353	- 9
Weighted mean					- 5

Consumers consider low nitrate content of vegetables as positive quality parameter. On average this can be achieved by fertilization with DMPP (results from 1998-2002). However, due to a prolonged N-availability with ENTEC-fertilizers, this effect is not always detectable.

Security

More compact growth extends harvest periode

NPK

NPK + DMPP



References:

Pasda G. et al. (2001) Effect of fertilizers with the new nitrification inhibitor DMPP on yield and quality of agricultural and horticultural crops. Biology and Fertility of Soils 34, 85-97
Zerulla W. et al. (2001) 3,4 Dimethylpyrazole phosphate (DMPP) – a new nitrification inhibitor for agriculture and horticulture: an introduction. Biology and Fertility of Soils 34, 79-84