Biomass Accumulation and Yield of Potato in Response to Management of Nitrogen with Nitrification Inhibitor DMPP

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INTRODUCTION

Nitrogen management is one of the key problems in potato growing, as it affects several parameters of potato growth, including the distribution of dry matter within the plant and the N and dry matter contents of the tubers. Excess of N is as harmful as N deficiency. Therefore, it is necessary to set up a system to determine the N requirement for this plant to avoid the adverse effect of excess N applications on both the crop yield itself, and also the environment.

MATERIAL AND METHODS

Soil: on a sandy-textured dystrophic Typic Hapludox (Soil Survey Staff. 2006)

Local: Three experiments were conducted in São Paulo State, Brazil from fall through winter seasons of 2011 and 2012. Two of them at the São Paulo State University (UNESP), São Manuel Experimental Farm identified as Experiment I and II, and the other one in Avaré (2012), on a commercial potato field, as Experiment III.

Treatments: the treatments comprised two rates (120 and 160 kg N ha^{-1}) of Entec fertilizer. It was either totally applied at planting or it was split applied (40 kg N ha^{-1} at planting; remainder split applied at hilling time ~ 20 DAE). There was one unfertilized as a control.

Evaluation: It was compared potato plant biomass and total and marketable tuber yields.

RESULTS

Table 2. Biomass accumulation of potato plant cultivated in a sandy soil as affected by rates and application time of nitrogenous fertilizer Entec 26.

N management	Root			Vines		
	Exp. I	Exp. II	Exp. III	Exp. I	Exp. III	Exp. III
	kg ha^{-1}					
No N applied	10.0a	11.1a	20.1a	233b	172d	348c
120 kg ha^{-1} planting	7.1a	12.3a	18.2ab	233b	343b	544b
120 kg ha^{-1} split applied	6.3a	12.0a	15.6b	400a	391b	823a
160 kg ha^{-1} planting	5.9a	10.0a	19.5ab	333ab	237c	532bc
160 kg ha^{-1} split applied	8.4a	13.3a	17.2ab	383a	498a	790a
P > F	0.264	0.515	0.210	0.044	<0.001	<0.001

	Tubers			Whole plant		
	Exp. I	Exp. II	Exp. III	Exp. I	Exp. II	Exp. III
	kg ha^{-1}					
No N applied	1,965b	1,815c	1,819c	2,208c	1,997c	2,187c
120 kg ha^{-1} planting	2,056bc	3,756b	2,796b	2,297bc	4,111b	3,358b
120 kg ha^{-1} split applied	3,349a	4,339ab	4,067a	3,756a	4,742ab	4,906a
160 kg ha^{-1} planting	3,164ab	2,532c	2,669bc	3,503ab	2,779c	3,221bc
160 kg ha^{-1} split applied	3,526a	4,599a	3,454ab	3,918a	5,111a	4,260ab
P > F	0.027	0.002	0.002	0.026	0.001	0.001

Values followed by different letters, in the column, were significantly different by the LSD test (p 0.05).

CONCLUSIONS

The split application of nitrogenous fertilizer Entec 26 at planting and hilling promotes a better growth and tuber yield compared to the whole N rate applied at planting.

OBJECTIVE

The objective of this study was to evaluate the effect of N rates and application timing strategy through use of Entec 26 fertilizer [Ammonium Sulfonitrate with nitrification inhibitor DMPP (3.4-dimethylpirazole phosphate)] on biomass accumulation, and yield of potato cultivar **Ágata** cultivated in a sandy soil in southeastern Brazil.

Table 1. Soil chemical and physical characteristics before planting.

Field	Year	O.M.	pH $_{(CaCl2)}$	$P_{(resin)}$	H+Al	Ca	Mg	K	CEC	V	Sand	Silt	Clay
		g dm^3		mg dm^3	———	mmol$_c$ dm^3	———			———	%	———	
São Manuel	2011	22.8	5.9	46.8	13.4	13.4	4.6	0.7	25.0	58	92.2	4.4	3.4
São Manuel	2012	22.0	5.8	57.1	12.7	12.7	4.4	0.6	29.9	57	87.4	10.2	2.4
Avaré	2012	23.3	5.8	64.4	18.6	20.6	5.8	1.9	46.8	60	86.4	12.6	1.0

Table 3. Total and marketable tuber yields of potato plant cultivated in a sandy soil as affected by rates and application time of nitrogenous fertilizer Entec 26.

N management	Total Yield			Marketable		
	Exp. I	Exp. II	Exp. III	Exp. I	Exp. II	Exp. III
	kg ha^{-1}					
No N applied	13,056c	7,782b	14,856c	12,768c	7,167b	14,727c
120 kg ha^{-1} planting	17,394b	10,952b	20,771bc	17,049b	10,454b	20,688bc
120 kg ha^{-1} split applied	25,473a	21,553a	26,333ab	25,263a	21,253a	26,258ab
160 kg ha^{-1} planting	21,696a	13,551b	20,829bc	21,437a	12,891b	20,795bc
160 kg ha^{-1} split applied	24,501a	19,900a	28,809a	24,242a	19,644a	28,727a
CV(%)	<0.001	0.002	0.004	<0.001	0.001	0.004

Values followed by different letters, in the column, were significantly different by the LSD test (p 0.05).