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ARTICLE

Do the previous crop and top-dressing nitrogen fertilization change the yield and physiological and sanitary quality of common bean seeds?

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ABSTRACT: The aim was to evaluate the effects of previous crop and top-dressing nitrogen fertilization on the yield and physiological and sanitary quality of common bean seeds. The design used was in randomized blocks in a split-plot scheme, with four replications. The plots were represented by three previous crops (sole maize, maize + *Urochloa ruziziensis* and sole *U. ruziziensis*), preceding common bean. The subplots consisted of N doses (urea) applied as top-dressing (0, 40, 80, 120 and 160 kg N.ha^{-1}) when the common bean had four expanded leaves. Physiological quality and sanitary quality of the seeds were evaluated through germination tests, first count, emergence speed index, accelerated aging, seedling emergence in the field and pathogen incidence, in addition to crude protein content, 100-seed weight and yield. The study factors did not interfere in the sanitary quality of the seeds. Under *U. ruziziensis* straw, the highest seed yield was obtained with the N dose of 115 kg.ha^{-1}, while under sole maize and intercropping straw, the increase in yield was linear. Previous crop with *U. ruziziensis*, whether cultivated as sole crop or intercropped with maize, promotes greater physiological quality of common bean seeds, while top-dressing nitrogen fertilization does not interfere with quality, weight and protein content of the seeds.

Index terms: intercropped maize, *Phaseolus vulgaris* L., seed vigor, *Urochloa ruziziensis*, *Zea mays* L.

RESUMO: Objetivou-se avaliar o efeito do cultivo antecessor e da adubação nitrogenada em cobertura sobre a produtividade e qualidade fisiológica e sanitária de sementes de feijão-comum. O delineamento utilizado foi em blocos casualizados em esquema de parcelas subdivididas, com quatro repetições. As parcelas foram representadas por três cultivos antecessores (milho exclusivo, milho + *Urochloa ruziziensis* e *U. ruziziensis* exclusiva), antecedendo o feijão. As subparcelas foram constituídas de doses de N (ureia) aplicadas em cobertura (0, 40, 80, 120 e 160 kg N.ha^{-1}) quando o feijão estava com quatro folhas expandidas. Avaliou-se a qualidade fisiológica e sanitária das sementes por meio dos testes de germinação, primeira contagem, índice de velocidade de emergência, envelhecimento acelerado, emergência em campo e incidência de patógenos, além do teor de proteína bruta, massa de 100 e produtividade de sementes. Os fatores de estudo não interferiram na qualidade sanitária das sementes. Sobre palhada de *U. ruziziensis*, a maior produtividade de sementes foi obtida com a dose de N de 115 kg.ha^{-1}, enquanto sobre as palhadas de milho exclusivo e do consórcio, o incremento de produtividade foi linear. O cultivo antecessor com *U. ruziziensis*, seja cultivada de forma exclusiva ou em consórcio com milho, proporciona maior qualidade fisiológica das sementes de feijão-comum, enquanto a adubação nitrogenada em cobertura não interfere na qualidade de sementes e na massa e teor de proteína das sementes.

Termos para indexação: milho consorciado, *Phaseolus vulgaris* L., vigor de sementes, *Urochloa ruziziensis*, *Zea mays* L.

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INTRODUCTION

Brazil is the world's second largest producer of common bean (*Phaseolus vulgaris* L.), with cultivation in various production systems and climatic conditions, reaching yields of more than 3,000 $kg.ha^{-1}$ (Filla et al., 2020; Meirelles et al., 2021). Despite the high production potential, the national average yield is low, with values close to 1,500 $kg.ha^{-1}$ (CONAB, 2021). This yield is the result of the technological level used in the cultivation of this legume, especially the low level of use of quality seeds (Silva et al., 2011a).

Usually in irrigated areas common bean is cultivated after some grass, especially maize. Producers also often use cover crops, such as *U. ruziziensis*, aiming at straw production for implementing a no-tillage system or even for nutrient cycling and reducing the potential of pests and diseases (Mingotte et al., 2020). In addition, there are also producers who intercrop maize with *U. ruziziensis* so as not to lose the benefits of the two crops, that is, the revenue generated by maize and the benefits generated by *U. ruziziensis* (Carmeis-Filho et al., 2014). In this context, the previous crops can interfere in the common bean cultivated in succession, so studies are required to generate specific recommendations.

Seed quality, characterized by genetic, physical, sanitary and physiological attributes, is highly influenced by the agricultural production system. Factors such as the previous crops and the use of mineral fertilizers are preponderant for the proper formation of reproductive structures (Gomes-Júnior and Sá, 2010; Arf et al., 2011; Abrantes et al., 2015; Pedrinho et al., 2019; Bagatelli et al., 2022).

Nutrients play a relevant role during the stages of seed formation, development and maturation, mainly in membrane constitution and accumulation of lipids, carbohydrates and proteins (Gomes-Júnior and Sá, 2010; Carvalho et al., 2015). Among the nutrients, nitrogen (N) is important in plant metabolism, as a constituent of protein molecules, coenzymes, nucleic acids, chlorophyll and other enzymes, which control plant development (Malavolta et al., 1997).

In common bean, the supply of N at sowing and as top-dressing is indispensable for the proper development of plants and production of seeds with high quality (Gomes-Júnior and Sá, 2010; Barbosa et al., 2011; Pedrinho et al., 2019). When studying the effect of N doses on the quality of common bean seeds, Pedrinho et al. (2019) found that the increase in doses positively influences the vigor and germination of common bean seeds up to the top-dressing N application of 100 $kg.ha^{-1}$. However, studies associating previous crops and N doses are scarce to generate more accurate recommendations for the production of common bean seeds.

High doses of N reduce the production of phenolic compounds, which have fungistatic leaf lignification action, reducing the resistance to obligate pathogens (those which need host), and possibly losing action on those that are facultative (those which can be saprophytes) (Marschner, 1995; Fiore-Donno and Bonkowski, 2021). The nutritional aspect of the plant has an indirect effect on the incidence of pathogens in seeds, since seed contamination can occur in the field (Abrantes et al., 2010). Thus, in addition to the previous crops, evaluating the effect of N fertilization on the yield and physiological and sanitary quality of common bean seeds is essential to provide more accurate recommendations.

In view of the above, the aim was to evaluate the influence of the previous crops and top-dressing N fertilization on the yield and physiological and sanitary quality of common bean seeds.

MATERIAL AND METHODS

The experiment was conducted at the *Universidade Estadual Paulista* (UNESP), School of Agricultural and Veterinarian Sciences, Campus of Jaboticabal, located at 21° 15' 22" S latitude, of 48° 18' 58" W longitude and 595 m altitude. The climate of the region, according to Köppen's climatic classification, is type Aw, characterized by hot and humid summers and cold and dry winters, besides having average annual precipitation of 1,425 mm.

The soil of the area is a *Latossolo Vermelho distrófico* (Oxisol), with clayey texture (540 $g.kg^{-1}$ of clay). Prior to common bean sowing, soil samples were collected in the 0-0.20 m layer and the results were: pH ($CaCl_2$) = 5.1; OM (Organic matter) = 22 $g.kg^{-1}$; P (resin) = 68 $mg.dm^{-3}$; K, Ca, Mg, H+Al, SB and CEC = 5.4, 22, 9, 31, 35.9 and 67.4 $mmol_c .dm^{-3}$, respectively; and V (base saturation) = 54%.

Four years before the beginning of the experiment, a succession system was implemented in irrigated no-tillage, involving maize and *Urochloa ruziziensis* crops cultivated in summer and common bean in winter/spring.

The experimental design used was randomized blocks in a split-plot scheme, with four replications. The plots were represented by three crop succession systems (sole maize, maize intercropped with *U. ruziziensis* and sole *U. ruziziensis*) preceding the common bean. The subplots consisted of N doses applied as top-dressing in the common bean (0, 40, 80, 120 and 160 kg $N.ha^{-1}$). Each subplot had six 5-m-long rows of common bean, and the 4 central rows were considered as usable area, disregarding 0.5 m at each end.

The common bean cultivar 'IAC Formoso' was sown in mid-August, at spacing of 0.45 m between rows, 12 seeds per meter and final population of 266,000 $plants.ha^{-1}$. Mineral fertilization at sowing consisted of 300 $kg.ha^{-1}$ of 05-15-15 formulation (N-P_2O_5-K_2O). Seedling emergence occurred 7 days after sowing. Top-dressing fertilizations were performed in the phenological stage V_{4-4}, characterized by the fourth fully expanded trifoliate leaf (Fernández et al., 1985), using urea as a source. The climatic conditions relative to the experimental period are shown in Figure 1.

The experiment was irrigated by a conventional sprinkler system, keeping an irrigation interval of 4 to 5 days depending on the crop needs. The total water depth applied via irrigation was 300 mm.

Harvest was performed manually in mid-November, totaling a 92-day cycle from sowing. At the time of harvest, the seeds had an average moisture content of 18%.

Seed yield ($kg.ha^{-1}$) was calculated using the production data of two rows within the usable area of each subplot, standardizing the moisture to 13% (wet basis).

The crude protein content of the seeds was determined (AOAC, 1995) using the following equation: CP = (Total N × 6.25), where CP = crude protein content in the grains ($g.Kg^{-1}$) and Total N = N content in the grains (Malavolta et al., 1997).

For physiological quality evaluations, the seeds harvested from the rows of the usable area were separated from those used to obtain yield. The seeds were manually threshed and then homogenized. Subsequently, the samples were dried at room temperature until they reached approximately 13% moisture. Then, they were placed in paper bags and stored in cold chamber at temperature of 0 °C and relative humidity of 35 to 40%. After six months of storage under these conditions, seed quality evaluations were performed. This time was used to better characterize the variations between treatments.

For the germination test, four replications of 50 seeds from each subplot were distributed in plastic boxes (26 × 16 × 9 cm) containing sand sifted, sterilized and moistened with distilled water until reaching 60% of the water retention capacity. The boxes were kept at temperatures of 20-30 °C under controlled conditions. The evaluation was performed on the eighth day after the test was set up (Brasil, 2009).

The first count test was conducted along with the germination test, considering the percentage of normal seedlings existing on the fifth day after sowing (Brasil, 2009). Emergence speed index (ESI) was determined along with the germination test, computing the normal seedlings during the evaluation period of the standard germination test (Maguire, 1962).

For the accelerated aging test (Marcos-Filho, 2020), the seeds were distributed in a single and uniform layer on stainless steel screens and placed in germination boxes with lids (11 × 11 × 3.5 cm), with 40 mL of deionized water at the bottom. These boxes were kept in a germination chamber at 42 °C for 72 hours (h). Subsequently, two replications of 25 seeds were placed in an oven at 105 ± 3 °C for 24 h to determine the moisture content, and four replications of 50 seeds were subjected to the germination test (plastic boxes with sifted sand), with evaluation performed on the fifth day after sowing.

Seedling emergence in the field was evaluated using four replications of 50 seeds per subplot, sown in 2.5-m-long rows and spaced 50 cm apart. The normal seedlings emerged were counted at 14 days after sowing (Krzyzanowski et al., 2020).

100-seed weight was obtained with eight subsamples of 100 pure seeds per subplot, using analytical scale with precision of 0.0001 g (Brasil, 2009).

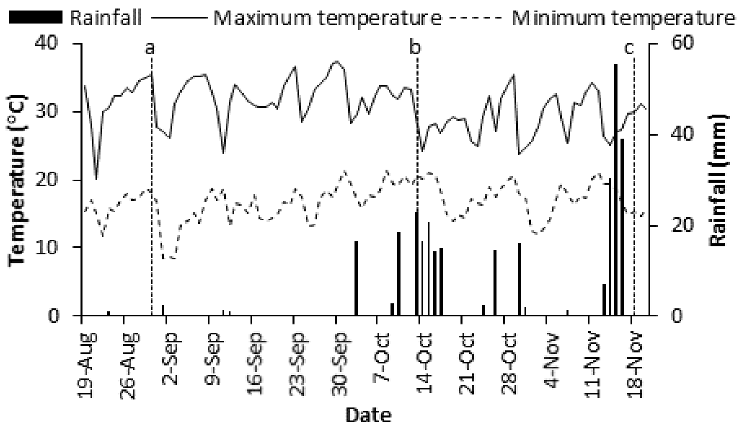

Figure 1. Rainfall (mm), maximum and minimum temperature (°C), mean every four days, referring to the common bean cycle: a = emergence of the crop; b = full flowering; c = harvest.

Seed health test was conducted using the filter paper or *Blotter test* method (Neergaard, 1977). A total of 200 seeds were evaluated, distributed in 20 replications of 10 seeds in Petri dishes previously disinfected with 1% sodium hypochlorite solution. Two sheets of filter paper, moistened with distilled water until reaching saturation, were placed on each dish. The seeds were distributed on them and remained in incubation for seven days, under 20 ± 2 °C and light regime of 12 h of light and 12 h of dark. Lighting was provided with 40 W fluorescent lamps, arranged on the dishes, positioned 40 cm apart. After the incubation period, the seeds were evaluated individually, using stereoscopic microscope and compound microscope, when necessary, for preparing microscope slides. In this test, one composite sample per treatment was used.

Given the assumptions of normality, by the Shapiro-Wilk test (Royston, 1995), and homoscedasticity of variances, by the Levene test (Gastwirth et al., 2009), the data were subjected to analysis of variance by the F test. When there was significance for the residual effect of N doses, the polynomial regression study was applied.

RESULTS AND DISCUSSION

Top-dressing N application in common bean, cultivated under straw of sole *U. ruziziensis*, had a quadratic effect on seed yield, reaching the maximum potential (3,454 kg.ha^{-1}) at the dose of 115 kg N.ha^{-1}. For the crop successions with maize as sole crop and maize intercropped with *U. ruziziensis*, the application of N fertilizer promoted a linear increase in seed production, with increments of 10.6 and 18.8 kg.ha^{-1} in yield for every 10 kg.ha^{-1} of N applied, respectively (Figure 2).

There was interaction between previous crops and top-dressing N fertilization for seed yield. In the absence of N fertilization, common bean plants grown under *U. ruziziensis* residues obtained higher yield (3,000 kg.ha^{-1}) compared to the other previous crops (~2850 kg.ha^{-1}). In addition, up to the dose of 115 kg N.ha^{-1}, this previous crop promoted higher yield increments compared to the others as a function of the increase in N application. This result demonstrates the advantage of including this forage species in the crop succession, and plants of the genus *Urochloa* have great capacity to accumulate N in their tissue (Carmeis-Filho et al., 2014), that is, they increase the N cycling rate, reducing the need for reapplying mineral N fertilizer for the common bean crop (Silva et al., 2011a; Soratto et al., 2013).

Mingotte et al. (2020) observed that sole *U. ruziziensis* promotes up to 139% and 80% higher N accumulation in straw compared to the amount N accumulated in sole maize and maize intercropped with *U. ruziziensis*. Barbosa et al. (2021), evaluating N fertilization managements in white oat crop in succession to *U. brizantha*, observed that the management without top-dressing N fertilization led to yield similar to that obtained with the highest dose applied

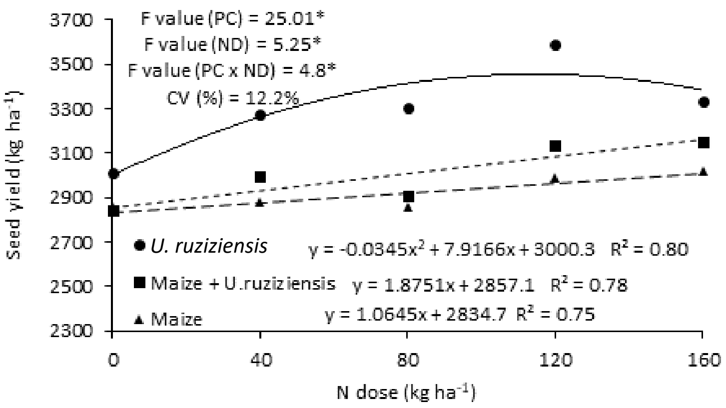

Figure 2. Decomposition of the interaction between cropping system and nitrogen doses for seed yield of common bean, cultivar 'IAC Formoso', in succession to sole maize (▲), maize intercropped with *U. ruziziensis* (■) and sole *U. ruziziensis* (●). CV: coefficient of variation; *p < 0.05; **p < 0.01.

(160 kg N.ha^{-1}). According to the authors, this occurred because of the amount of N left in the soil by the straw and the increase in soil OM promoted by forage.

Another aspect to be considered in seed yield is the benefits of the forage for the physical and biological properties of the soil. The inclusion of *U. ruziziensi*s in the crop rotation system contributes to improving the structure of tropical soils due to the increase in carbon content, and the aggregation process favors the physical protection of soil organic matter (Coelho et al., 2020).

Germination and vigor of common bean seeds, evaluated by the first count of the germination test, seedling emergence in the field and ESI were not influenced by the N doses applied as top-dressing (Table 1). This result corroborates those obtained by Barbosa et al. (2011), who observed that N doses did not interfere in the physiological quality (germination, first count, ESI, accelerated aging and electrical conductivity) of common bean seeds cultivated in winter. In the winter season, Peres et al. (2018) observed that N supply managements had little effect on the physiological quality (germination, first germination count, emergence, accelerated aging, electrical conductivity) of common bean seeds. On the other hand, Pedrinho et al. (2019) observed that the physiological quality of seeds (germination, accelerated aging, ESI, electrical conductivity) of common beans grown in summer was increased by the increase in N doses up to 100 kg.ha^{-1}.

The results presented by the authors mentioned above, associated with those verified in the present study, show that the management of N supply for common bean grown in winter or spring does not interfere with the physiological quality of its seeds. This occurs because the climatic conditions of milder temperatures, lower amount of rainfall and lower relative air humidity for the cultivation of common beans in autumn, winter and spring in much of the Brazilian territory favor the obtaining of seeds with high physiological and sanitary quality. Zucareli et al. (2016) evaluated the effects of P doses and growing seasons on the physiological quality of seeds in common bean cultivars. The authors verified that the cultivation of common beans in autumn (dry season) favors the obtaining of seeds with higher physiological quality compared to the rainy season, leading to higher germination rate and vigor.

In relation to the previous crops, differences were observed in the germination and vigor of the seeds, especially for the cultivation on crop residues of *U. ruziziensis*, as sole crop and intercropped with maize (Table 1). The cultivation of common beans after these cropping systems promoted higher values of germination, first germination count and seedling emergence speed index. The effect of crop remains on seed quality is probably related to the quantity and quality of plant residues deposited on the soil, considering that they have varying effects on its chemical properties and, consequently, on plant nutrition (Arf et al., 2011; Coelho et al., 2020; Mingotte et al., 2020).

Table 1. Germination, first germination count, seedling emergence in the field and emergence speed index for seeds of common bean, cultivar ‘IAC Formoso’, grown with application of top-dressing nitrogen doses in succession to sole maize, maize + *U. ruziziensis* intercropping and sole *U. ruziziensis*[1].

Treatments	Germination	First germination count	Seedling emergence in the field	Emergence speed index
	--------------------	%	--------------------	
Previous crop (PC)				
Maize	94 b	79 b	95	33.2 b
Maize + *U. ruziziensis*	98 a	93 a	96	35.8 a
U. ruziziensis	97 a	94 a	97	35.9 a
CV (%)	2.4	9.1	1.57	3.8
N dose (kg.ha^{-1})				
0	95.7	91.7	95.78	35.2
40	96.3	85.8	96.22	34.4
80	96.3	84.5	95.55	34.5
120	95.7	89.5	95.78	34.9
160	96.3	92.8	95.68	35.7
CV (%)	3.2	8.5	4.00	3.6
F test				
PC	14.60*	21.77*	6.38^{ns}	27.31*
N	0.17^{ns}	2.75^{ns}	0.04^{ns}	2.12^{ns}
PC × N	1.02^{ns}	1.60^{ns}	1.31^{ns}	1.92^{ns}

[1]Means followed by equal letters do not differ from each other by the Tukey test at 5% probability of error. * significant at 5% probability level and ns – not significant by the F test.

Despite the effect of cropping systems on seed germination process, it is worth point out that, regardless of the treatment, seeds are considered suitable for commercialization, because germination rates exceeded the minimum value considered appropriate for the commercialization of common bean seeds (80%) (CONAB, 2018).

The maize and *U. ruziziensis* cropping systems interfered in 100-seed weight, in the protein content of the seeds and did not alter the values of the accelerated aging test (Table 2). For 100-seed weight, the cultivation of common beans after *U. ruziziensis* promoted higher values compared to the succession with sole maize. The higher vigor of seeds of common bean grown after sole *U. ruziziensis* and maize intercropped with *U. ruziziensis* is probably related to their protein content, and the content of these biomolecules was higher in seeds of common bean cultivated under residues of *U. ruziziensis* (Table 2). Scientific results have already been found on the beneficial effect of plant proteins on the vigor of common bean seeds (Gomes-Júnior and Sá, 2010). Pedrinho et al. (2019) observed a direct correlation between protein content in common bean seeds with germination rate and vigor parameters.

Given the positive results of the forage for protein content in the seeds, *U. ruziziensis* possibly supplied a greater amount of N to the soil compared to maize residues. This fact is related to the lower C/N ratio of *Urochloa* straw compared to that of maize, a characteristic that confers greater cycling of N and other nutrients (Soratto et al., 2013; Mingotte et al., 2020). N plays a fundamental role in the metabolic pathways of synthesis of organic molecules, being considered a structural component of free and protein amino acids (Marschner, 1995).

In addition to the role of N in protein synthesis, Carvalho et al. (2001) reported that there is a significant positive correlation between N content in the plant and 100-seed weight (r = 0.45), which demonstrates the importance of this

Table 2. Accelerated aging, 100-seed weight and crude protein content in seeds of common bean, cultivar 'IAC Formoso', grown with application of top-dressing nitrogen doses in succession to sole maize, maize + *U. ruziziensis* intercropping and sole *U. ruziziensis*[1].

Treatments	Accelerated aging (%)	100-seed weight (g)	Crude protein content (%)
Previous crop (PC)			
Maize	84.0	26.3 b	18.3 b
Mazie + *U. ruziziensis*	86.9	26.8 ab	24.0 a
U. ruziziensis	88.1	28.1 a	22.4 a
CV (%)	5.1	3.8	14.5
N dose (kg.ha^{-1})			
0	84.9	26.8	22.7
40	85.1	26.2	22.9
80	87.8	27.6	21.9
120	87.3	27.4	19.0
160	86.7	27.3	21.4
CV (%)	7.1	5.8	14.8
F test			
PC	3.52^{ns}	12.99*	13.53*
N	0.40^{ns}	1.19^{ns}	2.16^{ns}
PC × N	2.00^{ns}	0.74^{ns}	0.30^{ns}

[1]Means followed by equal letters do not differ from each other by the Tukey test at 5% probability of error. * significant at 5% probability level and ns – not significant by the F test.

nutrient in the development of reproductive structures. In view of the results found in the literature and those obtained in the present study, the mineralization of N from *U. ruziziensis* was sufficient, and, not limiting, for the formation of seeds with high vigor, because the N supply through mineral fertilization did not influence the development of seeds.

Evaluating the effect of crop successions with cover crops on the physiological quality of common bean seeds, Pedrinho et al. (2019) observed that the highest germination and vigor rates were obtained in succession with common bean cultivation after millet + jack bean. According to the authors, this succession promoted a greater amount of straw on the soil with intermediate C/N ratio, assisting in the availability of nutrients to common bean plants, reduction of soil water loss by evaporation and reduction of mineral (soil) impurities in seeds. Abrantes et al. (2015) observed higher germination and vigor of common bean seeds under no-tillage system than under conventional soil tillage. These results demonstrate that the maintenance of straw on the soil promoted by the no-tillage system increases the physiological quality of common bean seeds, and this effect is directly proportional to the amount of straw in the soil.

The cultivation of maize and *U. ruzizien*sis in intercropping and sole *U. ruzizien*sis promotes a greater amount of plant residues compared to the cultivation of sole maize (Mingotte et al., 2020). Thus, the greater amount of residues on the soil possibly intensified soil biological processes, which exert great influence on the physiology of common beans (Carmeis-Filho et al., 2014).

The seeds showed low incidence of pathogens, regardless of the treatment applied (Table 3). Nitrogen fertilization can influence seed contamination, which is related to the role of N in the inhibition of organic compounds with fungistatic action and in the synthesis of amino acids in cells, and the high concentration of these molecules creates

Table 3. Incidence of fungi in seeds of common bean, cultivar 'IAC Formoso', grown with application of top-dressing nitrogen doses in succession to sole maize, maize + *U. ruziziensis* intercropping and sole *U. ruziziensis*.

Treatments	*Alternaria alternata*	*Aspergillus* spp.	*Colletotrichum lindemuthianum*	*Penicillium* spp.
	---------------------------------- % ----------------------------------			
Sole maize				
0 kg N.ha^{-1}	16	3	1	4
40 kg N.ha^{-1}	12	1	1	4
80 kg N.ha^{-1}	12	4	1	5
120 kg N.ha^{-1}	12	8	3	6
160 kg N.ha^{-1}	10	3	1	1
Maize + *U. ruziziensis*				
0 kg N.ha^{-1}	10	1	-	2
40 kg N.ha^{-1}	7	2	-	3
80 kg N.ha^{-1}	10	3	1	1
120 kg N.ha^{-1}	10	2	1	1
160 kg N.ha^{-1}	4	3	1	2
Sole *U. ruziziensis*				
0 kg N.ha^{-1}	3	3	-	7
40 kg N.ha^{-1}	8	4	1	5
80 kg N.ha^{-1}	5	2	-	3
120 kg N.ha^{-1}	10	7	-	5
160 kg N.ha^{-1}	13	6	1	8

favorable conditions for the development of pathogens in plant tissue (Abrantes et al., 2010). Despite this report, the results of the present study demonstrate the absence of interference of N on the health of common bean seeds.

Even under irrigation and with high humidity in the harvest period, due to high rainfall (Figure 1), the occurrence of pathogenic fungi was low. This occurred because most of the common bean cycle occurred under conditions of low temperature, precipitation and relative humidity. Thus, the source of inoculum was reduced throughout the common bean cycle, not generating enough inoculum for infection, although the conditions were favorable for the incidence of pathogens. These results were contrasting to those obtained by Silva et al. (2011b), who reported that the high humidity caused by the rain reduces the sanitary quality of seeds, with a greater possibility of occurrence of diseases.

With the growing need to produce more, in order to meet the demand for food, new cultivation technologies associated with new sowing seasons become paramount for the establishment of the crop with high production potential. Cultivation of common bean in the winter-spring season under irrigation system was shown to be promising for promoting high yields and seeds with high physiological potential. Additionally, the climate and the conditions and characteristics of the crop rotation/succession program may hamper the development of pathogenic fungi, further optimizing the production of common bean seeds with physiological and sanitary quality in this period.

CONCLUSIONS

Cultivation of common beans under irrigation in winter-spring after the cultivation of *Urochloa ruziziensis* results in seeds of higher physiological quality, with higher weight and high crude protein content.

Seed yield is affected by the interaction between previous crops and top-dressing nitrogen fertilization, with the highest values obtained after the cultivation of *Urochloa ruziziensis* at the N dose of 115 kg.ha^{-1}.

The sanitary quality of common bean seeds is not altered by the previous crop and nitrogen doses applied as top-dressing.

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