

## **DOSES OF JITIRANAS IN COVERAGE AS GREEN MANURE IN PRODUCTIVITY OF LETTUCE**

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**ABSTRACT** – Aiming to evaluate the agronomic characteristics of lettuce (*Lactuca sativa* L.), curly type, was performed an experiment in the greenhouse of the experimental area of the garden, of the Department of Plant Sciences, Rural Federal University of Semi-Arid (UFERSA), state of Rio Grande do Norte, Brazil. It was used a complete randomized design with seven treatments and four repetitions, totaling 28 experimental units. The treatments were constituted by: T1 (no fertilizer), T2 (22,8g dry jitirana in coverage), T3 (45,6g of dry jitirana coverage) and T4 (68,4g of dry jitirana in coverage), T5 (91,2g dry jitirana in coverage), T6 (114,0g of dry jitirana in coverage) and T7 (456g of cattle manure). The harvest happened 35 days after the transplanting, it's been evaluated the characteristics: plant high, number of leaves, the mass of the fresh and dry matter per vase. The increasing of the shoot part and the increasing of fresh matter in the leaves of the plants were statistically superior to control and the regression indicates the possibility of utilization of these doses of jitirana.

**Key words:** *Merremia aegyptia* L., Ground cover, *Lactuca sativa* L

## **DOSES DE JITIRANA EM COBERTURA COMO ADUBO VERDE NA PRODUTIVIDADE DE ALFACE**

**RESUMO** - Com o objetivo de avaliar as características agrônômicas da alface (*Lactuca sativa* L.), tipo crespa, foi realizado um experimento na casa de vegetação da área experimental da horta, do Departamento de Ciências Vegetais da Universidade Federal Rural do Semi-Árido (UFERSA), estado do Rio Grande do norte, Brasil. Utilizou-se o delineamento inteiramente casualizado com sete tratamentos e quatro repetições, totalizando 28 unidades experimentais. Os tratamentos foram constituídos por: T1 (ausência de adubação); T2 (22,8g de jitirana seca em cobertura); T3 (45,6g de jitirana seca em cobertura); T4 (68,4g de jitirana seca em cobertura); T5 (91,2g de jitirana seca em cobertura); T6 (114,0g de jitirana seca em cobertura) e T7 (456g de esterco bovino). A colheita foi realizada aos 35 dias após o transplante, sendo avaliadas as características: altura das plantas, número de folhas, massa da matéria fresca e seca por vaso. O crescimento da parte aérea e o aumento da matéria fresca nas folhas das plantas foram estatisticamente superiores ao controle e a regressão indica a possibilidade da utilização dessas doses de jitirana.

**Palavras-Chave:** *Merremia aegyptia* L., Cobertura de solo, *Lactuca sativa* L.

## **DOSIS DE JITIRANAS EN LA COBERTURA DE ABONO VERDE EN LA PRODUCTIVIDAD DE LA LECHUGA**

**RESUMEN** - Con el fin de evaluar las características agronómicas de la lechuga (*Lactuca sativa* L.), el tipo de rizado, se realizó un experimento en invernadero en el área experimental del jardín, el Departamento de Ciencias de las Plantas,

Universidade Federal Rural de la Zona Semiárida (UFERSA), estado de Rio Grande do Norte, Brasil. Se utilizó un diseño al azar con siete tratamientos y cuatro repeticiones, totalizando 28 unidades experimentales. Los tratamientos evaluados fueron: T1 (sin fertilización), T2 (22,8 g jitiranas seca en la cobertura), T3 (45,6 g de cobertura jitiranas seco) y T4 (68,4 g jitiranas seca en la cobertura), T5 (91,2 g jitiranas seca en la cobertura), T6 (114,0 g de cobertura jitiranas seco) y T7 (456g de estiércol). La cosecha se realizó 35 días después del trasplante, y evaluaron las características: altura de planta, número de hojas, peso fresco y peso seco por maceta. El crecimiento de los brotes y el aumento de las hojas de la planta fresca fueron estadísticamente superiores al control y la regresión indica la posibilidad de utilizar jitiranas estas dosis.

**Palabras claves:** *Merremia aegyptia* L., plantas de café, *Lactuca sativa* L.

## INTRODUCTION

According to IAC (2010) defines the lettuce (*Lactuca sativa* L.), as, Vegetable of *Cichoriaceae* family, it has as a center of origin the Asian region, it arrived in Brazil in the sixteenth century though the Portuguese, it is the leafy vegetable of the higher consumption in Brazil.

It is a popular vegetable in the whole world being the most important leafy in Brazil, with a planted area of 35,000 ha. Its cultivation is intensive and usually practiced on family farms, responsible of the generation of five direct jobs per hectare (COSTA and SALA, 2005; GRACIANO et al., 2007).

The plant is demanding on the physical and chemical properties of soil. As it is of short cycle, the leaves been the consumed part, it responds to nitrogen supply. The ideal soil for growing it, is the sandy-clay soil rich in organic matter and nutrients (FERREIRA et al. 1993; FILGUEIRA, 2000). In the cultivation of this vegetable is a common application of high amounts of nitrogen fertilizer, which can provide excess N, resulting in nitrate accumulation and reduction of product quality and contamination to the soil (FONTES et al., 1997).

In this sense, nowadays there is greater demand for organic products and alternative fertilization has aroused the farmers as green manure, as a viable and economical way to promote or restore the nutrients in the soil. In that contest, legumes have been the most used species. According to Silva et al. (2002), the benefit of the use of leguminous green manure is to reduce chemical nitrogen application, because these plants fix nitrogen from the air, through symbiosis with bacteria of the gender *Rhizobium*, enriching the soil with this macronutrient.

However, species from other families can help to promote the benefits to soil fertility and thus promote greater crop productivity. According to Favero et al. (2000), the spontaneous species can promote the same effects of land cover, production of biomass and nutrient cycling that introduced species or cultivated for green manure. Thus, spontaneous species of the savanna have been studied in order to fertilize the soil and promote benefits to crops.

Among these species, the jitirana (*Merremia aegyptia* L.) spontaneous plant of savanna, convolvulus creeper family that comes at the beginning of the rainy season, been one of the first plants to germinate. This is due to the large number of seeds arising from the previous

year, since it presents tegument dormancy with germination averaging around 15 to 20% in under natural conditions. This specie can be found in environments that have soil texture: sandy, clayey, sandy and clayey vertisols (LINHARES et al., 2005). It reaches productivity of green biomass around 36,000 kg ha<sup>-1</sup> with macronutrient content of the order of 2.62% N, 0.17% P; 1.25% C, 0.04% K, and 1.08% Mg. It has been used as green manure LINHARES et al 2007).

Given the above, it was aimed to evaluate the effect of green manure using jitirana (*Merremia aegyptia* L.) pasture covered on the productive performance of lettuce (*Lactuca sativa* L.).

## MATERIALS AND METHODS

The experiment was conducted from November to January of 2010, in the greenhouse at the experimental area of the garden, of the Department of Plant Sciences, Rural Federal University of Semi-Arid (UFERSA), located in the city of Mossoro-RN with geographical coordinates 5 ° 11 'south latitude, 37 ° 20' W. longitude Gr, with 18 m, with an average annual temperature around 27.5 ° C, relative humidity of 68.9%, annual average cloudiness of 4.4 tenths and mean annual precipitation of 673.9 mm; with weather hot and dry, located in the semiarid region of northeastern of Brazil (CARMO FILHO et al., 1991).

The lettuce studied was the curly type "Nanny of the summer." It was applied the completely randomized design with seven treatments and four replications, totaling 28 experimental units. It was used vases with a capacity of 11.4 dm<sup>3</sup>. The treatments were evaluated: T1 (no fertilizer), T2 (22.8 g dry jitirana in coverage), T3 (45.6 g dry jitirana coverage) and T4 (68.4 g dry jitirana in coverage), T5 (91.2 g dry jitirana in coverage), T6 (114.0 g dry jitirana coverage) and T7 (456g of manure).

Based on the volume of the vases the treatments corresponded to 0, 4, 8, 12, 16, 20 and 80 t ha<sup>-1</sup> on a dry basis, respectively.

The jitirana used in the experiment was harvested in the experimental area of UFERSA, where the plant was crushed in conventional fodder machine, resulting in particles of 2.0 to 3.0 cm, which had the following chemical characteristics: 11.0% dry matter, 2.6% of N, 0.17% P, 1.2% Ca, 1.4% K, with production of green biomass of 3.5 kg m<sup>-2</sup>.

The vases were placed on wooden benches in a greenhouse covered with polyethylene with side ventilation. The jitirana was added to the soil surface as the treatments mentioned above. The cattle manure was added to the soil surface and mixed with the entire volume of the vase. During the experiment conduction was carried water daily, always correcting the moisture content of soil. It was let the compost (jitirana) react with the soil for forty-two days as determined by LINHARES et al. (2009) and after that period, made the transplanting of lettuce.

For the filling of vases with volume of 11.4 dm<sup>3</sup> was used soil collected in an area close to the experiment, classified as sandy, whose chemical analysis proceeded according to the methodology recommended by Embrapa (1999) showed the following results in the topsoil of 0-20 cm: pH 7.7, MO 3.02 (g kg<sup>-1</sup>), P 100.29 (mg dm<sup>-3</sup>), N 0.34 (g kg<sup>-1</sup>), K 0, 16 (mg dm<sup>-3</sup>), Ca 3.40 (Cmolc dm<sup>-3</sup>), Mg 1.00 (Cmolc dm<sup>-3</sup>) In 0.18 (Cmolc dm<sup>-3</sup>).

The seedlings were grown in disposable cups of 150 ml it has been transferred to vases when they had two true leaves. In each vase, two graves were opened and a transplanted lettuce seedlings per hill. At 35 days after transplanting, the plants were collected and transferred to the Postharvest Laboratory, of the Department of Plant Sciences, for the determination of growth characteristics. The characteristics evaluated were: plant height (measured in a sample of eight plants per treatment, from ground level to the higher end of the leaves, expressed in cm.plant<sup>-1</sup>), number of leaves (determined on the same sample eight plants, counting the number of leaves per plant, expressed in terms of average per plot), mass of

green matter (determined in the same previous sample from the weight in accuracy balance in four decimal places in grams plot<sup>-1</sup>) and dry mass (measured from the same sample above, the dry weight in an oven with forced air at 70oC until constant weight, expressed in g.parcela<sup>-1</sup>).

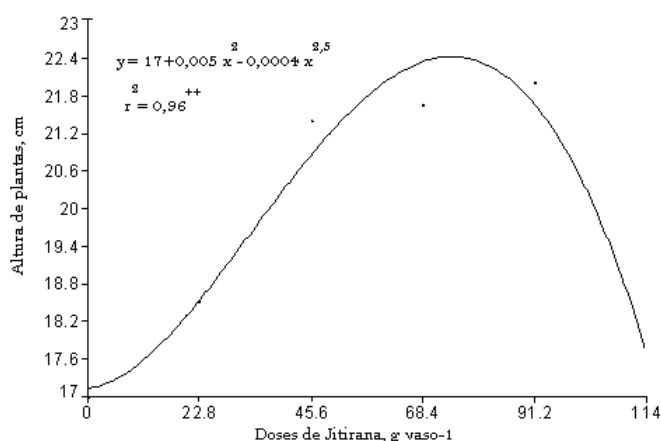
Analysis of variance for the characteristics evaluated was performed using the application software ESTAT (KRONKA; BANZATO, 1995). The procedure for adjustment of response curve was performed using the software Table Curve (JANDEL SCIENTIFIC, 1991).

## RESULTS AND DISCUSSION

Significant effect was observed between doses of jitirana applied to the soil cover in height and number of leaves per plant, weight of green and dry matter per vase (**Figures 1 to 4**).

This result came from the nutritive value of jitirana and its relation C/N that is 18/1 that favors the mineralization over immobilization and synchrony between the period of greatest demand by the crop and time of opening the material that was favored by 42 days of application before planting of lettuce.

In relation to the plant height, the dose of 74 g jitirana per vase it provided the largest height with an average of 21.9 cm. Between the lowest and highest dose there was an increase of approximately 23% (**Figure 1**).



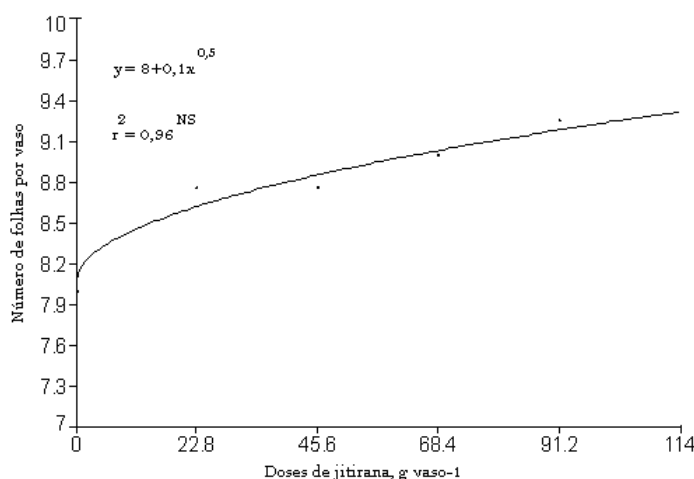
**Figure 1.** Plant height in function of doses of jitirana topdressing applied in the plot.

The observed value was lower than those obtained by Linhares et al. (2007), which was 22.30 cm

using jitirana *Ipomoea glabra* in growing arugula "Grown," among the lowest (2.2 Mg ha<sup>-1</sup>) and highest (8.8 Mg ha<sup>-1</sup>) amount of jitiranas tested.

An increasing of number of leaf per vase was observed between the largest and the smallest dose of

jitirana been registered an average of nine leaves per plant (**Figura 2**). This result was inferior compared the result obtained by Lima et al. (2207), when was observed two leaves per plant, in the evaluation of quantity of jitirana of Ipomas green fertilizer in crop of urugula of the wide leaf.

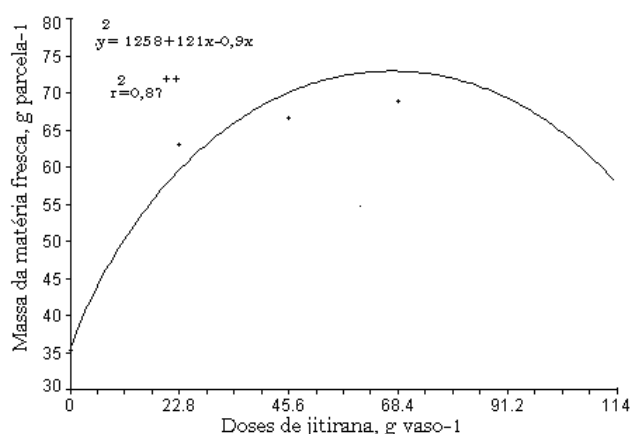


**Figura 2.** Number of leaves per plant in function of jitirana doses in covered applied in plot.

The lettuce crop reached its maximum value at a dose of 67g of jitirana with accumulation of fresh mass of 73g vaso<sup>-1</sup>. The relative difference between the extreme values of the average of treatments for fresh mass in a function of doses of jitirana applied to soil was approximately 100% in relation to the lower dose (0 g pot<sup>-1</sup>) and the dose of greater increase (67 g pot<sup>-1</sup>) (**Figure 3**).

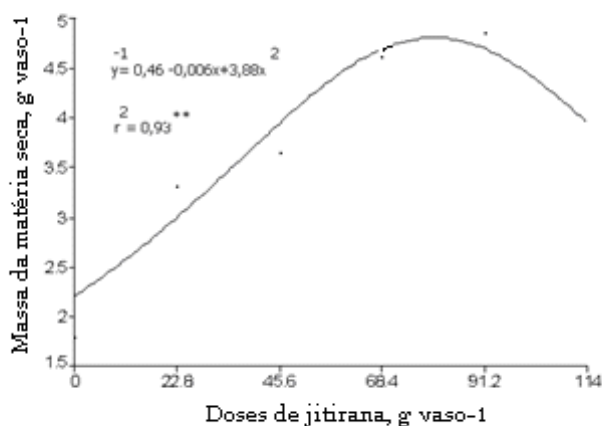
According to Fernandes (1997) when organic wastes meet the need of nitrogen, provide the nutrients required for growth and development of plants.

Lopes et al. (2005) by testing doses of sewage sludge with ordinary superphosphate found productivity of 185g tree<sup>-1</sup>, being superior to that work. Already Linhares et al. (2009) evaluating jitirana at different times of decomposition with the highest average per plot at 35 days with an average portion of 60g<sup>-1</sup> less than the present study.



**Figure 3.** Mass of the fresh matter of lettuce per plot in function of the jitrana dose covered applied to the soil.

The highest yield of dry matter was observed at a dose of 80 g of jitrana applied to the soil, having accumulated 4.8 g per vase. This increase was approximately 112% between the lowest dose (0g pot<sup>-1</sup>) and larger increase in dose (80 g pot<sup>-1</sup>) (**Figure 4**).



**Figure 4.** Dry mass of lettuce per plot in function of on the jitrana doses covered applied to the soil.

A study accomplished with jitrana, Linhares et al. (2009) the maximum value found was of the order of 2.56 g pot<sup>-1</sup> at 35 days of incorporation evaluating jitrana at different times of decomposition. As Adams et al. (2007) using fertilizer legumes as alternative sources of nitrogen (velvet-gray gliricidia and litter) in the production of arugula, recorded increases of 0.6 g of dry matter per vase between fertilizer, values which are lower than found this work.

Considering the results obtained, it is possible to affirm that in soils with similar characteristics to this experiment, with the jitrana with features that employed in this study can be used as green manure for growing lettuce.

## CONCLUSIONS

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