

## CULTIVATION OF CORINDER IN SUCCESSION OF THE LETTUCE CULTURE

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**ABSTRACT-** The use of natural resources disposable in the farm producers it is important to obtain income, and in Brazil northeast region it has been found different spontaneous species as sources of nutrients in the caatinga biome to be used as green manure. This work was conducted at the experimental farm Rafael Fernandes of the Department of Plant Sciences, Federal Rural University of the Semi-Arid (UFERSA), Mossoro, RN, from January to February 2010 with the purpose of to evaluate the cultivation of coriander in succession lettuce. The experimental design was randomized complete block with treatments arranged in 4 x 4 factorial design with three replications, with 144 plants per plot, the first factor consists of the amounts of jitrana (5.4, 8.8 12, 2 and 15.6 t ha<sup>-1</sup> on a dry basis), the second time by its incorporation into the soil (0, 10, 20 and 30 days before sowing - DAS). The cultivar of coriander planted was Verdão. The evaluated characteristics were: height and number of stems per plant, fresh and dry mass of shoots. It was observed a significant interaction for number of stems per plant and yield. The best agronomic performance of the coriander was obtained in the amount of 8.02 t ha<sup>-1</sup> t ha<sup>-1</sup> of silk-flower incorporated into the soil at the time of 30 days. For each ton of flower is incorporated into the soil dry silk observed an average yield of coriander in the order of 395 kg ha<sup>-1</sup>.

**Keywords:** *Coriandrum sativum* L., *Merremia aegypti* L., green manure.

## CULTIVO DO COENTRO EM SUCESSÃO A CULTURA DA ALFACE CULTIVATION OF CORINDER IN SUCCESSION OF THE LETTUCE CULTURE

**RESUMO-** O uso de recursos naturais disponíveis na fazenda de produtores torna-se importante para obtenção de renda, e na região nordeste do Brasil encontramos diferentes espécies espontâneas como fontes de nutrientes no bioma caatinga para ser utilizado como adubo verde. Este trabalho foi conduzido na fazenda experimental Rafael Fernandes do Departamento de Ciências Vegetais da Universidade Federal Rural do Semi-Árido (UFERSA), Mossoró-RN, no período de janeiro a fevereiro de 2010, com o objetivo de avaliar o cultivo de coentro em sucessão a alface. O delineamento experimental usado foi de blocos completos casualizados com os tratamentos arranjados em esquema fatorial 4 x 4, com três repetições, com 144 plantas por parcela, sendo o primeiro fator constituído pelas quantidades de jitrana (5,4; 8,8; 12,2 e 15,6 t ha<sup>-1</sup> em base seca), o segundo pelos tempos de sua incorporação ao solo (0, 10, 20 e 30 dias antes a semeadura - DAS). A cultivar de coentro plantado foi a Verdão. As características avaliadas foram: altura e número de hastes por planta, matéria fresca e massa da matéria seca da parte aérea. Foi observada interação significativa para número de hastes por planta e produtividade. O melhor desempenho agrônômico do coentro foi obtido na quantidade de 8,02 t ha<sup>-1</sup> t ha<sup>-1</sup> de flor-de-seda incorporada ao solo, no tempo de 30 dias. Para cada tonelada de flor-de-seda seca incorporada ao solo observou-se um rendimento médio de coentro da ordem de 395 kg ha<sup>-1</sup>.

**Palavras-chave:** *Coriandrum sativum* L., *Merremia aegyptia* L., adubação verde.

## INTRODUCTION

Coriander is a vegetable crop of great value and commercial importance, being a lot commercialized in Brazil, with large volume of import and national production of seeds (NASCIMENTO, PEREIRA, 2003). In Brazilian northeastern, this vegetable is explored almost exclusively for the production of green leaves. It is rich in vitamins A, B1, B2 and C, good source of calcium and iron (FILGUEIRAS, 2000).

Most planting is done in home gardens, which are conducted by small farmers using hand labor family and having as a source of fertilizer the manure (cattle and goats) in their production systems. Thus, the dependence of these inputs makes the producer vulnerable in order that it not always has this capability on your property; therefore, it is the acquisition which increases production costs.

One of the alternatives to allow these production systems is the green manure, which according to Perin et al. (2004), states that employment in the production of these vegetables may represent significant contributions to the economic viability and sustainability of agroecosystems, the input of significant amounts of nitrogen to the soil-plant system, thus reducing the need for synthetic N. In addition to the contribution of N, green manures mitigate erosion and play an essential role in nutrient cycling, both those applied through fertilizers and not used by crops, and those from the mineralization of soil organic matter and plant material itself. (PERIN et al., 2003).

According to Favero et al. (2000) the species most commonly used green manure are legumes because they have the ability to fix nitrogen through symbiotic bacteria in their root systems. However, the same author says that the spontaneous species can contribute to soil fertility in the same way as legumes. In this context, Linhares et al. (2009a, 2009b, 2009c, 2009d) says that the spontaneous species from caatinga as jititrana, silk-flower and mata-pasto has contributed positively in vegetables arugula, lettuce and radish in organic production systems. It is noteworthy that when adding a green manure to the soil it will bring benefits not only to the first crop, but also the successive crops is characterized by the employment of such input feasibility.

Therefore, the objective was to evaluate the performance of coriander in succession of the lettuce in organic system.

## MATERIAL AND METHODS

The experiment was conducted at the experimental farm Rafael Fernandes, located in the district of Alagoinha, rural area of Mossoro-RN, in period of January to February 2010 in a soil classified as Type Yellow Podzolic sandy loam (EMBRAPA, 2006). Alagoinha district is located in the following coordinates: latitude 5o03'37 "S and longitude 37o23'50" W Gr, at an altitude of approximately 72 m, lying 20 km from the city of Mossoro-RN. According to Thornthwaite, the local climate is NDAA ', or, semi-arid, megathermal and with little or no excess water during the year, and according to Köppen is BswH', dry and very hot, with two seasons: a dry, which generally covers the period from June to January and a rainy season between February and May (CARMO FILHO et al., 1991).

Before the experiment soil samples were taken at a depth of 0-20 cm, which were air-dried and sieved at 2 mm mesh, were then analyzed in the Laboratory of Chemistry and Fertility of Soils UFERSA, whose results were as follows: pH (1:2.5 water) = 6.0, Ca = 2.0 cmol c dm<sup>-3</sup>, Mg = 0.5 cmol c dm<sup>-3</sup>, K = 0.12 cmol c dm<sup>-3</sup>, In = 0 , 20 cmol c dm<sup>-3</sup>, P = 27.7 mg dm<sup>-3</sup> and MO = 0.36%.

Initially the culture of lettuce was crop. To this end, we used the experimental design in randomized complete block with treatments arranged in a 4 x 4 factorial with three replications. The treatments included a combination of four amounts of silk flower to the ground: 5.4, 8.8, 12.2 and 15.6 t ha<sup>-1</sup> on a dry basis, with four times of incorporation: 0, 10, 20 and 30 days before sowing of lettuce - DAS.

The cultivar was planted coriander "Verdão" (SAKATA, 2002).

Soil preparation consisted of manual cleaning with hoe and removal of the material out of the area and collection of experimental plots used with hand held hoe.

The silk flower was collected from native vegetation near the campus of UFERSA, at the beginning of the flowering period where the plant has the maximum concentration of nutrients (Figure 1), crushed in machine fodder into pieces 2 to 3 cm diameter, sun-dried, stored in raffia bags with a moisture content of 8%, to later be used as green manure. Five samples were taken for chemical analysis where the chemical concentration of nitrogen-N, phosphorus and potassium-P-K for silk-flower were (22.4, 10.0 and 22.0 g kg<sup>-1</sup> of the material on a dry basis , respectively). Quantified and incorporated in the 0 - 20 cm of soil in the experimental plots for each treatment.



**Figure 1:** Illustration of Asclepiadaceae silk-flower (*Calotropis procera*), spontaneous kind of scrub at the beginning of flowering and fruit formation in full. Mossoró-RN, UFERSA, 2010.

After the harvest of lettuce on 04/12/2009, proceeded to clean the beds and planting coriander on 10/12/2009. Coriander (*Coriandrum sativum* (Ait.) R. Br) was planted at 0.2 x 0.05 m spacing, a mean, 0.2 and 0.05 between of plants used and waste left by the silk flower in the lettuce.

Propagation by seeds of the coriander was in no tillage, making up thinning to eight days after plant emergence (DAE).

The harvest of coriander was performed 30 days after sowing on 10/01/2010. At harvest the following characteristics were evaluated: plant height (taking a sample of twenty plants making measurements from base to apex with a millimeter ruler plant expressed in cm-1), number of stems (taken from a sample of twenty plants stems being counted and expressed in terms of average), productivity (consisted of weighing all the useful plants of the area, totaling 160 plants, with a precision scale of 1.0 gram and expressed in kg ha-1) and mass dry matter (determined by drying in an oven with forced air at 65 ° C to constant weight and expressed in kg ha-1).

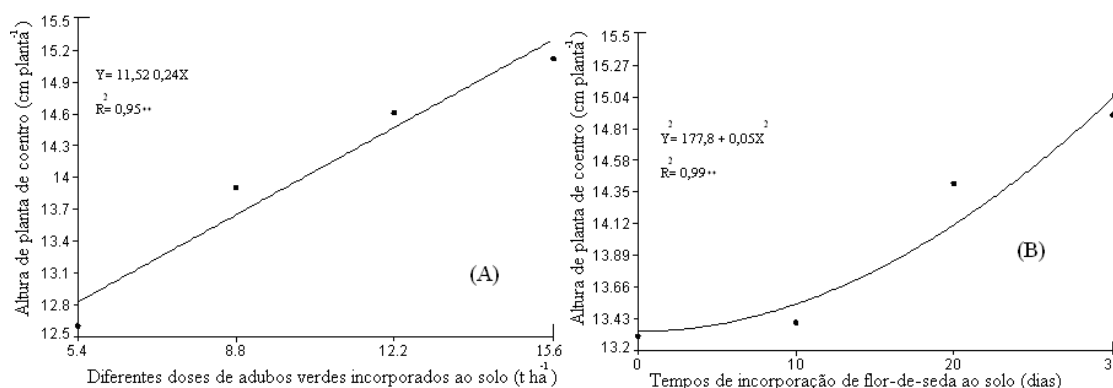
Analysis of variance for the characteristics were performed using the application software ESTAT (BANZATO; KRONKA, 1995). The procedure of adjustment of response curve was performed using the software Table Curve (JANDEL SCIENTIFIC, 1991).

## RESULTS AND DISCUSSION

In this study, we observed a significant interaction between the factors studied (doses and times of incorporation of silk-flower on a dry basis) characteristics: number of stems per plant and productivity. However, significant effects for the traits plant height and dry matter of coriander (Table 1).

In plant height, the highest average was observed at a dose of 15.6 t ha-1, corresponding to 3 cm plant-1 over the lower dose (5.4 t ha-1). An upward trend was observed between the different doses of green manure.

(Figure 2a). In relation to the time of decomposition was observed that the time of thirty days of the merger was promoting greater plant height 15.0 cm-1 (Figure 2b).

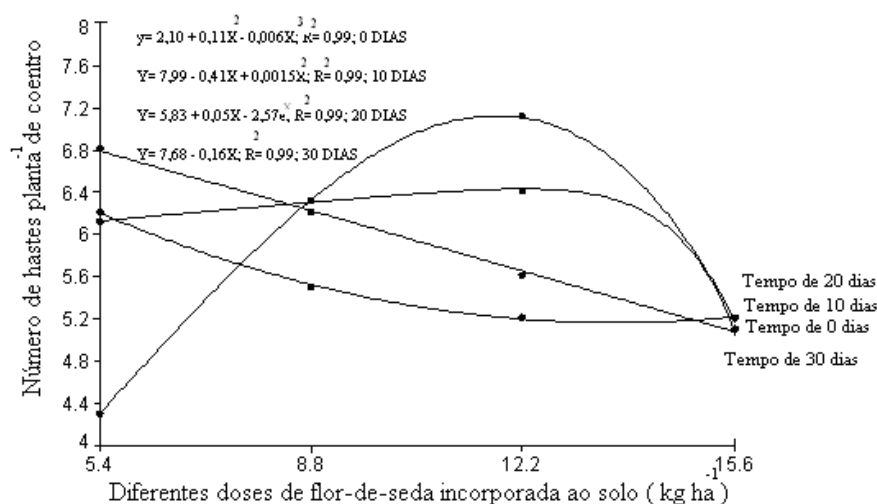


**Figure 2.** Coriander plant height under the residual effect of different amounts (A) and time of incorporation of silk-flower (B) incorporated into the soil. Mossoró-RN, UFERSA, 2010.

These results demonstrate the efficiency of the silk flower in improvements of better fertility in soil, contributing to plant growth.

Nunes et al. (2007), evaluating the effects of sources, doses and intervals of application of organic compounds in the productivity of cabbage and coriander in the production system, observed the coriander plant height of 29.6 cm with 40 t ha<sup>-1</sup> of organic compost, is superior to that work. What may be related to the fact that such work be the culture of coriander in the first cultivation, besides the top too much compost in relation to the residual effect of 15.6 t ha<sup>-1</sup> from silk flower

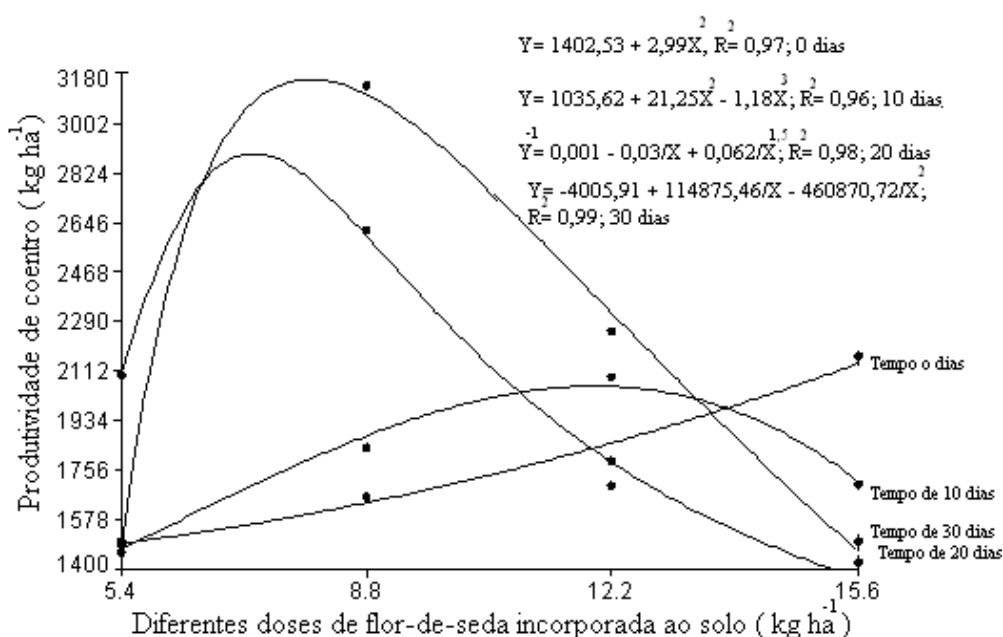
Unfolding the doses within the time of incorporation of the silk flower the number of stems of coriander, it was observed that the greatest number of stems recorded was 7.1 in the time of 0 days of incorporation at a dose of 11.8 t ha<sup>-1</sup>. Corresponding to an increase of 65% over the lowest dose (5.4 t ha<sup>-1</sup>) and number of stems 4.3 (Figure 3). This increase corresponded to an increase of 2.8 leaves per plant. Regarding the other times were obtained lower average number of stems, with average values of 6.2, 6.4 and 6.8 times in 10, 20 and 30 days at doses of 5.4, 12.2 and 5, 4 t ha<sup>-1</sup> respectively.



**Figure 3.** Unfolding doses of silk-flower in time for incorporation into the soil under the residual effect on the number of stems of coriander. Mossoro-RN, UFERSA, 2010.

This result was lower than that obtained by Lima et al. (2007), who observed two leaves per plant, in assessing amounts of jitirana *Ipomoea glabra* as green manure in growing Large Leaf arugula. Being inferior to that found by Almeida et al. (2007), studying fertilizers of legumes as alternative sources of nitrogen in the production of organic fertilizer using rocket-gray providing an increase of about 6 leaves per pot, about twice that obtained in this work.

Unfolding the interaction of the residual effect of dose within each time incorporating the silk flower (Figure 4) has been observed that the highest average yield (3152.5 kg ha<sup>-1</sup>) was achieved with the residual effect at a dose 8, 02 t ha<sup>-1</sup> and 30 days in the time of incorporation. Corresponding to an average increase of 1688.5 kg ha<sup>-1</sup> in relation to the higher dose of silk flower, which was 15.6 t ha<sup>-1</sup>, with an average yield of 1464 kg ha<sup>-1</sup>. Tavella et al. (2010) studied the organic cultivation of coriander in directly planting using cover living and dead, fertilized with compost, found productivity of 3454 kg ha<sup>-1</sup> in the system of planting plants with spontaneous inferior to that work. There was a significant yield of coriander per ton of silk flower incorporated into the soil, corresponding to 395 kg ha<sup>-1</sup>.



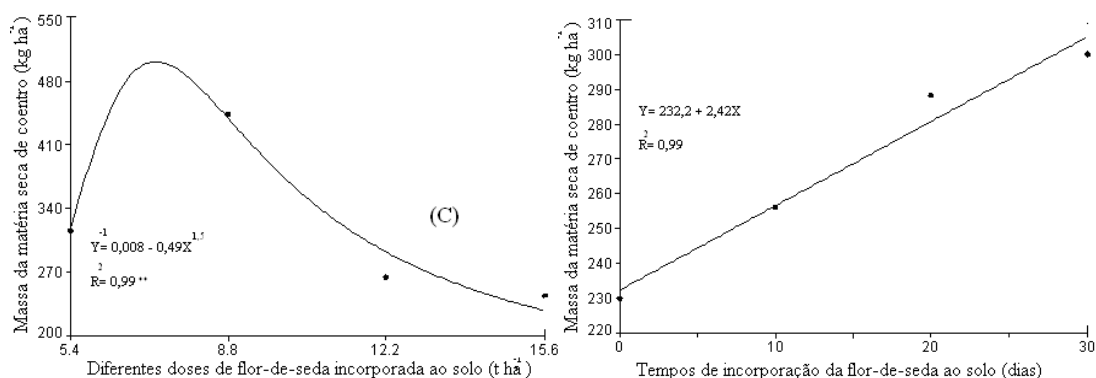
**Figure 3.** Residual effect of different doses of silk flower incorporated into the soil in the coriander productivity. Mossoro-RN, UFERSA, 2010

This behavior of doses in relation to time, possibly is related to the fact that the crop succession (coriander) because of its short cycle (30 days in our region) has had its greatest expression in agronomic pleased residual effect of the age of 20 30 days of incorporation of silk flower, and, on the occasion of the coriander plant those times were 60 to 70 days of incorporation which probably has the highest absorption occurred in view of the material ( silk flower) have a C / N ratio between 20 and 30 / 1, which contributed to a rapid decomposition and mineralization. Positive results using spontaneous species of the caatinga in the productivity of coriander have been observed. A similar result for this interval of 20-30 days, was found by Linhares et al. (2010) when they tested mata-pasto as green manure in coriander, found better

results for the characteristics of plant height, number of stems per plant, weight of fresh and dry shoot when the time of decomposition of this material was 28 days.

Linhares et al. (2010) studying jitirana proportions with silk flower found mean values of 16.85 g.parcela-1, noting an increase of 8 g.parcela-1.

In relation to dry matter maximum values of 482 and 315 kg ha-1 was obtained at a dose of 7.6 t ha-1 and 30 days of incorporation, showing that only one dose was possible to find the maximum point for feature mentioned above (Figure 4c and 4d). These values were lower than those found by Linhares (2009) studying different amounts of green manure and fertilizer types in the culture of coriander with values of 540, 550 and 480 for jitirana, silk flower mata-pasto respectively.



**Figure 4.** Split doses of silk-flower in time for incorporation into the soil under the residual effect on dry matter coriander. Mossoro-RN, UFERSA, 2010.

## CONCLUSIONS

There was an interaction of doses in relation to the decay times for the number of stems of coriander and productivity with maximum values of 7.1, 3152.5 kg ha<sup>-1</sup> for number of stems of coriander and productivity at doses of 11.8 and 8.02 t ha<sup>-1</sup> respectively.

In relation to plant height, the highest averages were 15.6 and 15.2 at doses of 15.6 t ha<sup>-1</sup> and 30 days of incorporation.

In the dry matter was maximum increase in the dose of 7.6 t ha<sup>-1</sup> and the time of 30 days of incorporation.

Given this, it should be noted that the residual effect of silk-flower has contributed positively in the culture of coriander.

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