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## Morphological criteria artichoke *Cynara scolymus* L. grown in the region of Kenitra in Morocco

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### ABSTRACT

Artichoke (*Cynara scolymus* L.) was planted 20 May 2009 and 15 June 2009 transplanted in a field of two hectares limited in the area of Sidi Slimane in Gharb. In a process completely at random, each hectare was divided into four plots to be cultivated in four densities:

D1 = 5.700 plants.ha<sup>-1</sup> (2 m x 1 m spacing inter plants)

D2 = 7.500 plants.ha<sup>-1</sup> (1.50 m x 1 m)

D3 = 8.500 plants.ha<sup>-1</sup> (2 m x 0,70 m) and

D4 = 11,500 plants. ha<sup>-1</sup> (1.50 m x 0.70 m).

The amounts of water provided by drip irrigation was 3750 m<sup>3</sup>.ha<sup>-1</sup>. The rest from precipitation.

The recovery rate of seedling planting measured after 20 days was between 90 and 95%.

The percentage of productive plants 100 days after planting was 70%.

The best total return of 16.3 tons per hectare was obtained at the Imperial Porn interaction densities (11,500 plants per ha).

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### KEYWORDS

Artichoke;

*Cynara scolymus* L.;

Imperial star;

Density multiplication by seed.

### INTRODUCTION

The artichoke is located in four continents of the world<sup>[1,10]</sup>. With areas that differ : Nearly 90 % of the total global area of the artichoke is distributed in Italy (50.120 ha), Spain (21,000 ha), France (10,500 ha), and Greece (2,500 ha), while only 10% involves South America (mainly Argentina with 4700 ha and 4300 ha

with Chile), California (3320 ha), North Africa (3800 ha with Egypt, Algeria with 2,800 ha, with 3300 ha on Morocco, Tunisia with 2,100 ha), the Middle East (Turkey, with 2,500 ha, 670 ha with Israel, Syria with 510 ha), and China (10,000 ha)<sup>[2]</sup>.

In Morocco, the area reserved for the artichoke cultivation is about 8500 ha in 1964. This area was granted by the dominant commercial value it brought to

## FULL PAPER

the country. Indeed, the production was a great flow exports to France. In 1981, the area fell to 6200 ha, due to a decrease in exports, falling prices on the local market and a drought that expressed the degeneration of plants<sup>[3]</sup>.

The geographical distribution of artichokes in Morocco varies by region. Artichokes are shared in the Gharb region. They get noticed with coverage of about 80%. The remaining 20% is shared between Moulouya (365 ha), Rabat -Salé-Zemmour Zaer (265), Taza Taounate Alhouceima (60) Chaouya Ourdigha (30) Fez Boulemane (20) Casablanca (10) and TansiftHapuz Marrakech (2). The superiority of artichokes in the Gharb region is explained by environmental conditions suitable soil and climate, by increasing irrigation schemes and the growing interest by farmers heard this type of culture.

The low yield of heads (less than 14 t/ha) is due to the local variety of low productivity, lack of varietal diversification, the high price of cuttings (3000-6000 DH/ha), low mastery techniques multiplication. These and other factors are causing loss of vegetation where agribusiness incorrect operation of the product by the hardware. Small scale units brine hearts and artichoke sections have not yet integrated their activities in order to develop new technologies to benefit the sector. They are limited to single pretreatment product. The latter is done in units outside the region exporting the finished product (bottom section and artichoke heart).

The total area reserved for culture evolves Triennial. In fact, every three years, there has been an increase of at least 136 ha of surface. During the first three years, the culture occupied an average of 3190 ha. The second period from 2004 to 2006 had occupancy of 3326 ha. The largest increase was observed from 2007 to 2009. Artichokes covered an average area of 3939 ha, 613 ha more than in the second period. The area of artichokes has increased by almost 20% from 2001 to 2009. Encouragement to this favored the extension of irrigation facilities,

Purchase cuttings, fertilizers and fertilizers, and the interest of farmers for this crop.

However, production will not increase in parallel with the surface. Indeed, during the first period (2001-2003), it averaged 46,470 tons, 54,065 tons in the second period (2004-2006) and 56,271 tons during the third (2007-2009). The increase during the periods

2001-2003 and 2004-2006 was 14%. While between periods (2004-2006) and (2007-2009), production increased by only 4%.

This is due to the lack of support for small farmers; non-compliance with the procedures laid down in the technical details of culture, flooding most of the Moroccan agricultural land, particularly the Gharb region best known for its culture artichoke.

The objective of this research is to study the morphological criteria and the requirements of this crop in the Gharb region, multiplied by seeds, and conducted four plant population densities: 11,500; 8,500; 7,500 and 5,700; plants.ha<sup>-1</sup> corresponding

Respectively the following distances: (1,50 m x 0,70 m), (2m x 0,70 m) (1.50 m x 1m), (2m x 1m spacing inter plants), densities chosen for this plant correspond to those recommended by the U.S. Schrader and Mayberry<sup>[4]</sup>.

## MATERIALS AND METHODS

The application was made in a field of two hectares, each hectare divided into four plots or density plots for two is applied, these are located in the region of SidiSlimane, in the Gharb, which is considered the most important production region of the artichoke in Morocco.

Transplantation was performed on 15/06/2009 same period as for Sobhand al<sup>[1]</sup>, irrigation of the crop has been grown using a drip irrigation system.

Culture has received during its life cycle, a water supply 3750 m<sup>3</sup>.ha<sup>-1</sup> provided by irrigation and the rest from precipitation. of phytosanitary treatments, Six manual weeding were carried out along the crop cycle.

The harvest took place from 15/10/09 to 20/04/10 for the same period Sobh and al.<sup>[1]</sup>

The experimental design was a completely randomized design, planting densities.

The experimental unit consists of four lines, the cultivar used is: Imperial star (IS). The density levels (distances) are experimental:

D1 = 5.700 plants.ha<sup>-1</sup> (2m x 1m spacing inter plants)

D2 = 7.500 plants.ha<sup>-1</sup> (1.50m x 1m)

D3 = 8.500 plants.ha<sup>-1</sup> (2 m x 0,70 m), and

D4 = 11,500 plants. ha<sup>-1</sup> (1.50 m x 0.70m).

The parameters analyzed are:

- the rate of emergency in the nursery,
- the rate of recovery after planting,
- Evolution of the number of leaves per plant,
- Evolution of the number of eyecups per plant
- Evolution of the percentage of plants bolting,
- Evolution of average weight of heads,
- Yield per plant and per hectare

**RESULTS AND DISCUSSION**

Weather requirements that dominated during the experience were adequate artichoke, in fact according to Schrafder and Mayberry<sup>[4]</sup>, artichoke demands air temperature, which varies between 7 and 29°C.

**Rate emergency in the nursery**

Stage ten days after sowing, emergence rate of seeds sown in the nursery was 88% this shows that the seeds have a good germination and seeding was successful According to Schrader and Mayberry<sup>[4]</sup> germination ten days after sowing, can reach 90% and this depending on cultivar and seed quality.

**Rate recovery after transplantation**

The rate of recovery 20 days after planting artichoke on the field was 90 to 95% Welbaum<sup>[5]</sup> obtained 89% recovery after planting the same cultivar.

**Evolution of the number of leaves per plant**

The average number of leaves per plant increases gradually as the plant increases (TABLE 1) and as it can be seen that the average number of leaves from 6 leaves per plant during the second month after planting to an average of 28 leaves per plant during the sixth month after planting and this course is to increase photosynthesis in plants.

**Evolution of the number of eyecups per plant**

When the active plant growth (until stage two months after planting). The appearance of eyecups (axillary shoots produced by the root) was on average 1 per plant at stage 2 months after planting (TABLE 2), and increases to reach the average of 5 per plant stage 8

months after planting.

**Evolution of the percentage of plants bolting**

The average percentage of the productive plants by bolting or plants in the total number of plants in a field (TABLE 3), from 70% to 100 days after planting, reaching 87% after 150 days after planting. Welbaum 1994<sup>[5]</sup> obtained a percentage of elongation of 92% in imperial start

**Evolution of average weight of heads of imperial star**

The average percentage of the weight of the heads decreases over time (TABLE 4), and so shegoesto270gforthedate10/02/2010 considere dearly period of the season to an average of 130g for the date of 28/05/2010 considered period end season.

The flowers are harvested early for the fresh market. The diameters of head srequired by this market are between 7.5cm and 13cm (Foury and Lime, 1997<sup>[6]</sup> Schrader and Mayberry, 1997<sup>[4]</sup>).

**Parameters related to the total production if different densities**

From TABLE 5 we note that the total yield per hectare increases from density 5700 plants that gives 11.4 (t/h) to the density of 11500 plants that gives 16.3 (t/h) considered the best overall performance and is close to the best density of 12000 plants per hectare

**TABLE 1: Variation of the average number of leaves per plant at the heart of its crop cycle**

Cultivar	number of months after planting	0	2	4	6
Imperial Star	average number of leaves	3	6	10	28

**TABLE 2 : Variation of the average number of eyecups per plant at the heart of its crop cycle**

Cultivar	number of months after planting	2	4	6	8
Imperial Star	average number of eyecups	1	2	3	5

**TABLE 3 : Variation of the average percentage of productive plants**

Cultivar	number of months after planting	0	50	100	150
Imperial Star	Average percentage productive plants	0	0	70	87

**TABLE 4 : Variation of the average weight of the heart surrenders of its crop cycle**

Date	10/02/2010	27/02/2010	07/03/2010	25/03/2010	05/04/2010	28/05/2010
the average weight of capitulum	270	200	180	170	140	130

## FULL PAPER

TABLE 5 : Variation of the average parameters of the plant of its crop cycle

Densité	Yield total by plant (kg/plant)	Average number of heads per plant	Average weight of heads per plant in (g)	Total heads per hectare	Yield total by Hectare (t/ha)
D1 = (2 m d'interlignes X 1 m d'inter plants)	2.00	13	200	57000	11.4
D2 = (1,50 m x 1 m)	1.70	12	170	75000	12.7
D3 = (2 m x 0,70 m)	1.70	12	170	85000	14.4
D4 = (1,50 m x 0,70m)	1.42	10	142	115000	16.3

multiplied by seeds found in<sup>[7]</sup>.

The latter gave 142g as average weight of heads per plant, 10 as average number of heads per plant and 1.42 kg as total yield per plant.

Rabgarajan and al<sup>[8]</sup> in 2000 showed that the imperial star cultivar gave the highest marketable yield.

### CONCLUSION

So through these different techniques of planting seedlings of artichokes in the region of Sidi Slimane as four densities we can say that the density D4: 11500 plants gave the best performance is 16.3 (t/h).

Or in most cases we find that the usual performance remains lower in D4.

This latter course is the result of a correct application of the requirements of the plant vis-à-vis the necessary and consistent treatment, weeding at the proper time and adequate irrigation, and are made by skilled operators or suffered effective training in this direction<sup>[9]</sup> Sobh and al. and supervised by a competent person.

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