CULTIVATION OF **SILYBUM MARIANUM GAERTN.**, A PROMISING MEDICINAL PLANT

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**ABSTRACT :** Silybum marianum Gaertn., commonly known as milk thistle, seeds of which yield ‘silymarine’ a flavanoid, has marked antihepatotoxic properties. It is being collected in larger quantities by the pharmaceuticals. There is a great need to cultivate this plant for the sustained supply of the seeds. A package of agrotechnology of the crop is reported in this paper.

**INTRODUCTION**

*Silybum marianum gaertn.* (Synonym:- Cardus marianus L.) commonly known as milk thistle, has been an age old remedy for the diseases of bile in Europe since olden days. It is a native of central and southern Europe, but has run wild in the sub-tropical places of Pakistan and India. The seeds if the plant yield around 2 per cent of total flavonoid calculated as silymarine having market antihepatotoxic properties. There has been an increasing demand for these compounds for use in the preparation of drug for cirrhosis of liver and jaundice.

The plant is a common weed of sub hilly regions in West Punjab and Frontier provinces of Pakistan. In India, its area of distribution is the foot hills and adjoining plains of Jammu and higher reaches of Kangra Valley in the north and a small tract between Coonoor and Ooty hills in Tamil Nadu. The plant generally occurs as roadside, railway tract weed, more frequently along nullahs and depressions overridden with moisture.

A survey conducted by the authors has revealed that the areas of commercial collection of seed in bulk from wild sources are the Jammu & Kashmir and Himachal Pradesh. Approximately 30 quintals of dry seed can be collected from the above mentioned localities. Recently large scale collection of seed have been done by various pharmaceutical industries. It is feared that this important raw material may be exhausted due to over exploitation and by new establishment of industrial units and private sector enterprises on its occurrence sites. Therefore, it was felt to undertaken the experimental cultivation of this important plant for sustained supply by growing the plant in an organized agricultural system.

**Cultivation Practices**

*Silybum marianum* can be grown on a wide range of soils, having assured water supply. The plant flourishes well on sandy loam soils rich in organic content. A range of $20^\circ$ c to $25^\circ$ c of maximum temperature accompanied with fairly good winter rainfall appears to be conducive to better vegetative growth of the plant.
Land Preparation: It being a shallow rooted crop, does not require deep village. The preparation of land is usually not as fine as for other cultivated crops. One or two ploughing area, however, necessary. 10 tonnes / ha of well decomposed farm yard manure is applied before ploughing the field for getting a good growth and applied irrigation for sowing of seeds.

Planting: The plant should be raised by sowing the seed proved more helpful for efficient cultural operation. 2-3 seeds are placed in loosened soil at the desired inter and intra row spacing and later covered with soil. One and a half to two kg seeds would be sufficient to stock one hectare of land. After the seed is germinated thinning is done, one healthy seedling is kept and rest are removed and utilized else where to fill the gaps, though sowing in situ proved to be best. Transplanting method can also be used if the land to be stocked is not vacant at the time of sowing of seed. Germination studies showed a period of six months dormancy from June to November. Mature seeds collected during first week of May showed 20, 31, 78 and 80 percent germination in December, January, February and March, respectively. The sowing of the seeds should be started from November and can be extended up to January. Under cultivated conditions flowering commences in the second or third week or February and continues till the end of March. Thus it is advisable to sow the seed in early November, so that plant gets sufficient time for attaining optimum vegetative growth and see yield.

Spacing: Nine inter and intra row spacing combinations i.e 30 x 15 cm, 40 x 15 cm, 50 x 15 cm, 30 x 30 cm, 40 x 30 cm, 50 x 30 cm, 30 x 45 cm, 40 x 45 cm and 50 x 45 cm were tried but found no significant difference in seed yield / ha (Table.1). It was observed that closer planting (30 x 15 cm and 40 x 15 cm spacing) resulted in taller plants with lesser side shoots due to competition. As the leaves and thistle of plant are thorny, closer planting also proved to be non conductive for all harvesting operations. It is, therefore, recommended to adopt the spacing of 50 x 30 cm for better growth, optimum yield and also conductive cultural operations. Minimum plant to plant distance should be not less than 35 cm.

Irrigation: First light irrigation is followed after 15 days of seed germination. Minimum five irrigation would be required during the active growing period of the crop. Irrigation at the time of flowering is essential. Two hand weeding after first and third irrigation should be done.

Fertilizers: Plant is mostly seen growing nicely in nature, usually near nallahs where lot of water and nutrition are assured. But under cultivated conditions, application of 40 Kg P₂O₅ in the form of super phosphate and 60 Kg K₂O in the form of potash per hectare in rows by placement method is applied. Nitrogen is applied at the rate of 40 Kg/ha in the form of urea in two splits, first dose being applied three weeks after germination followed by second dose one month before flowering, i.e., mid January or first week of February.

Crop harvesting: Flowering is initiated in the third week of February and goes on till the plant withers in May. The thistle heads grow into full size within 30-40 days. The harvesting of thistle head is to be done when about 50 per cent of these have grown in full size indicated by withered petals. Delay in harvesting may cause seeds shedding resulting in heavy loss. Usually two harvesting are made, first in the second week of April followed by another in May. After the thistle heads are harvested these
are dried in the sun. On drying, the thistles open up releasing seeds and pappins. Long pruning sheers should be used for harvesting thistle heads. The fresh thistle heads on drying yielded 10 percent seed on an average. About 2500 kg fresh thistle per hectare is obtained, from the naturally grown plants, which is equivalent to 250 kg of dry seeds. This poor yield of seed is due to damage of thistle by parrots, who relish its seed too much. The above yield was obtained without giving any attention to the crop. The crop totally saved from parrots yielded 6280 kg fresh thistle per hectare equivalent to 6.28 qtls dry seeds. The test weight of 1000 seed worked out is 16.9 g with 55,000 seed per kg.

**Drying:** The material kept in open sun for about 5 to 7 days dries completely. The dried material which consists of ruptured heads, dry sticks and leaves is beaten with long sticks to separate seeds from the heads. During the beating, the dry material should be kept covered with gunnies or any other cloth so as to arrest the spread of pappins which create great nuisance if allowed to float in air. The seed and extraneous material are separated through sifting and winnowing. A further drying seed for a day or two is recommended before the material is finally stored.

**Economics:** After considering all inputs, the estimated cost of production of one kg seeds comes to Rs. 12.78 and a net profit of Rs. 39,070 per hectare can be obtained from this seven month duration crop of rabi season. The present prevailing price in the market is Rs. 75/- per kg seed. However, seed value has been quoted up to Rs. 650/- per kg by some seed suppliers.

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TABLE 1
Effect of spacing combinations on growth and yield of *Silybum marianum* (Mean of Two years)

| Inter & Intra row spacing (cm) | Plant Height (cm) | No. of thistles per plant | Seed wt. per thistles (g) | Fresh wt of thistles / ha (Qtls) | Seed yield / ha (Qtls) |
|-------------------------------|------------------|---------------------------|---------------------------|---------------------------------|------------------------|
| 30 x 15                       | 121.8            | 8.46                      | 0.945                     | 61.71                           | 6.003                  |
| 40 x 15                       | 121.0            | 8.71                      | 0.973                     | 61.15                           | 6.087                  |
| 50 x 15                       | 121.2            | 8.50                      | 0.938                     | 60.80                           | 6.049                  |
| 30 x 30                       | 118.7            | 8.80                      | 0.975                     | 61.20                           | 6.115                  |
| 40 x 30                       | 119.2            | 9.70                      | 1.001                     | 61.75                           | 6.135                  |
| 50 x 30                       | 118.8            | 10.11                     | 1.003                     | 62.80                           | 6.280                  |
| 30 x 45                       | 117.9            | 10.20                     | 1.014                     | 60.43                           | 5.998                  |
| 40 x 45                       | 118.1            | 9.95                      | 1.020                     | 60.32                           | 5.905                  |
| 50 x 45                       | 117.3            | 10.08                     | 1.015                     | 59.60                           | 5.830                  |
| CD (5%)                       | N.S              | N.S                       | N.S                       | N.S                             | N.S                    |

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