Agrotechnology of St. John's Wort (*Hypericum perforatum* L.)

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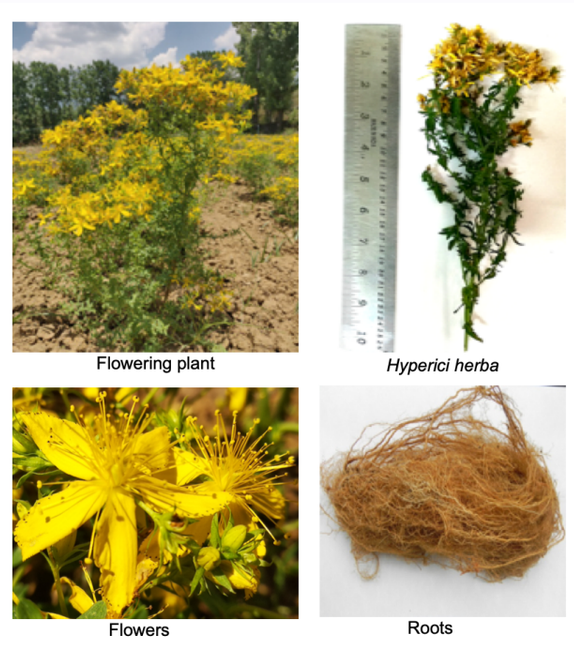
Introduction

Hypericum perforatum L., commonly known as St. John's Wort (SJW) or Basant, are among the top-selling preparations used by the pharmaceutical and nutraceutical industries. The use of this plant as an herbal remedy to treat internal and external ailments dates back to the time of the ancient Greeks. It is a perennial, freely branched, broad-leaved, multi-stemmed, hairless, erect, plant with a woody structure at the base and extensive creeping rhizomes producing buds from the roots, that grow to an average height of 40–80 cm. The stems and branches are covered by the smooth oval margined leaves with minute translucent spots that are evident when exposed to the light, and coppery, yellow coloured flowers with 4–5 petals are present at the apical part of the plant.

Part Used and Bioactive Constituents

The flowering tops of plants (*Hyperici heba*) are considered as the main medicinal material and are the major source of therapeutically important constituents hypericin (a naphtodianthrone) and hyperforin (a phloroglucinol), which are used worldwide for the treatment of mild to moderate depression. According to the European Pharmacopoeia (2020) and WHO monographs (2004), *Hyperici herba* should contain at least 0.08% hypericin; however, the American Herbal Pharmacopoeia (AHP) demands at least 0.04%. Furthermore, the monograph of *H. perforatum* presented by the United States Pharmacopeial Convention (2015) states that *Hyperici herba* should contain hypericin, pseudohypericin not less than 0.04% and at least 0.06% hyperforin.



Different parts of *Hypericum perforatum* plant

Soil and Climatic Requirement

The plant is distributed throughout the world (Europe, United States, Asia, North Africa, and North America) including diverse habitats from temperate areas to high mountain regions in the tropics with altitudes up to 3000 m amsl (above mean sea level). Its natural range extends from areas with low winter temperatures to subtropical environments, although the best performance was registered in areas with at least 760 mm annual rainfall. The plant grows naturally in mesophytic areas, and proliferates well in temperate open sunny areas having well-drained, coarse-textured, slightly acidic to neutral soils (4.3–7.0) but is prone to saturated or wet soils.

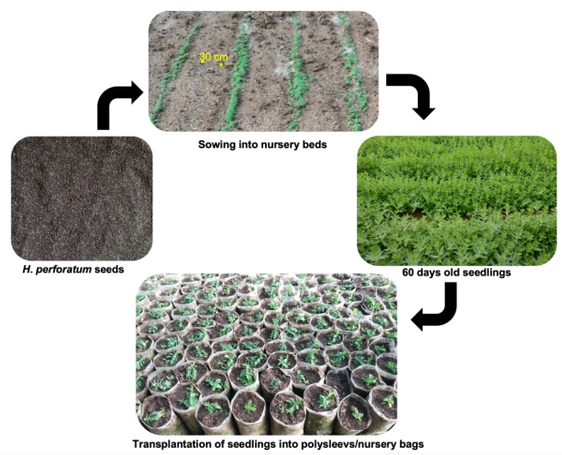
Propagation

The crop can be propagated by seeds, division, or by softwood cuttings but propagation through seeds is much familiar practice. The seeds can be propagated through nurseries and direct sowing/broadcasting methods. However, direct sowing is not advisable due to its lower yield and a higher seed rate (3–4 kg/ha). Therefore, it is suggested that the plant should be propagated through seeds by raising seedlings in the nursery and then transplanting them into the main field. Approximately 500 g of seeds are required for raising seedlings for one hectare area.

Nursery Raising

The cultivation of crop is done through the raising of a nursery. The appropriate time of raising nursery is before frost in October. Raised seedbeds of 10–15 cm in height

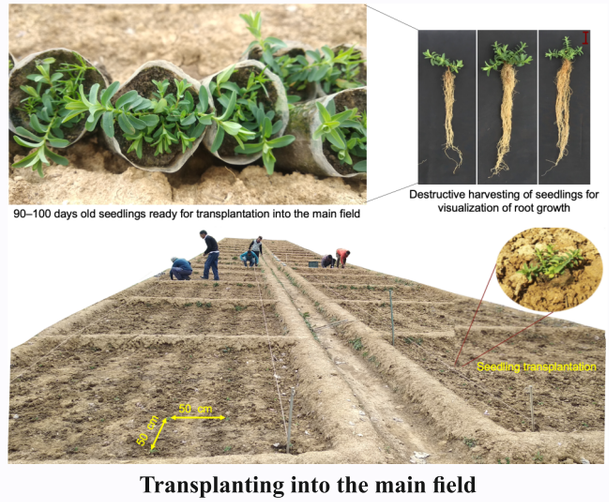
should be thoroughly prepared by the addition of well-decomposed farmyard manure (FYM) @ 1 kg/m² and fine sand @ 1 kg/m² followed by well mixing. Beds of 1 m x 4 m, having irrigation channels should be laid out and seeds (20–25 g/bed) should be mixed with fine sand (1:10) and sown in lines of 30 cm apart, care should be taken to avoid deep sowing. Generally, seed should be sown within a depth range of 0.3–0.5 cm. Do not cover the seed but gently press into the soil. The nursery beds should irrigate immediately after sowing and regularly thereafter. It is advisable to cover the seed bed after sunset with a thin polythene sheet to avoid frost injury and to maintain the temperature at night. The cover should be removed during the day time. Usually, the seeds start germinating 7–10 days after sowing, and the germination will be complete within 30–35 days. Frequent hand weeding should be done to maintain a weed-free nursery bed. Sixty-days-old seedlings are further transplanted into polysleeves or nursey bags having a sand:soil:FYM in 1:1:1 ratio as a nursery substrate. The seedlings will be ready for transplanting in about 90–100 days after attaining a height of 10–15 cm.



Nursey raising technique

Land Preparation and Transplanting

The land should be well prepared with 2–3 ploughings until a fine tilth of soil is obtained. Well decomposed farmyard manure @ 10 t/ha, otherwise vermicompost @ 5 t/ha has to be applied before the 2nd and 3rd ploughing. The 90-100 days old seedlings having an average height of 10–15 cm are transplanted in the main field in mid-January with a spacing of 50 cm plant to plant and 50 cm row to row. Transplanting should be preferably done in the morning or evening hours to avoid transplantation shock. Cloudy weather and fine drizzle are considered ideal for transplanting. Irrigation is required just after the planting.



Transplanting into the main field

Fertilization and Irrigation

A fertilizer dose of 120:60:40 kg/ha of N, P_2O_5, and K_2O, respectively, is recommended for profitable yield. Irrigation depends upon the moisture in the field. Generally, irrigation is required once in a week, however in rainy season, no irrigation is required. Irrigation should be stopped, before harvesting. Generally, the plants

require more water in areas with winter rains, and less in areas with winter snow

Weed Management

Normally the seedlings become well established in the main field one month after transplanting. At this stage, first weeding should be done and subsequently the second is done one month after the first. No further weeding is required thereafter as the plants become bushy and thereby suppress the growth of weeds.

Weed free *Hypericum perforatum* plants at vegetative stage

Harvesting and Post-harvest Processing

The crop should be harvested at flowing time (mid-June). Flowering tops are excised and kept for drying under shaded conditions at room temperature. The dried material should be kept under dark conditions. The average yield of *Hyperici herba* is 1.5-2.0 t/ha during the first year when the crop is grown as annual crop. The yield of 3.5-4.0 t/ha is obtained from second year after cultivation when the crop is grown as perennial crop.

Ready to harvest *Hypericum perforatum* plants at flowering stage

The cost of cultivation

Cost of Cultivation	**Rs. 1.0 -1.5 lakh/ha/Year**
Gross Returns	**Rs. 3.0 - 4.0 lakh/ha/Year**
Net Returns	**Rs. 2.0 - 2.5 lakhs/ha/Year**

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