

Raised bed planting for boosting productivity and profitability of baby corn

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Baby corn is a high-value crop that requires optimal growing conditions to maximize profitability and productivity. Raised bed planting (RBP) can be termed as a creative agriculture practice which has the potential to enhance profits and productivity levels of baby corn. This method entails raising the soil surface to form 'beds' which allows for proper drainage and aeration as well as better root growth and nutrient absorption. Through RBP, it is possible for farmers to improve the density of planting, reduce the chances of water logging as well as improve the thermal regime of soils to get a more even growth pattern and high yield. This article examined the benefits of RBP in baby corn production, comparing it to conventional farming methods, and provided recommendations for its adoption to enhance sustainability and economic returns in small and large-scale farming operations.

Keywords: Baby corn, Nutrient acquisition, Productivity, Profitability, Raised bed planting, Sustainability

MAIZE (*Zea mays* L.), whose origin can be traced back from Central America and Mexico, is one of the 21st century's crops with highest potential for yield, versatility in growth and utilisation. Among the specialty corns, baby corn has got popularity and owing to better market returns, economic value, export, and greater employment opportunities. Young corn, corn-lets or baby sweetcorn are other names for baby corn, a kind of maize. Baby corn is picked when the silks are 2–3 cm long. At this stage, the small, immature cob is unfertilised, dehusked, and eaten raw or used as a vegetable (stir-fries, salads, and canned goods). Baby maize, a speciality crop, provides milch animals with nutrient-rich, soft, and green feed. Farmers prefer 3–4 harvests annually due to market demand and short growing season.

Nutritional value

Half a cup (serving size) of boiled baby corn contains 18 calories, 0.1 g fat, 1.7 g protein, 3.6 g carbohydrates and 1.2 g dietary fibre. Besides, it also has vitamin A (276 retinol equivalents), vitamin C (16 mg), potassium (483 mg), sodium (158 mg), magnesium (76 mg), calcium (51 mg) and iron (2 mg). Potassium aids in managing blood pressure, while magnesium is vital for muscle and nerve function. Iron is important for the production of red blood cells, and zinc plays a key role in supporting the immune system.

Challenges in traditional baby corn farming

Traditional baby corn farming faces many challenges affecting its productivity, profitability, and sustainability. Key challenges

include high labour intensity due to careful handling needed during planting, maintenance, and harvesting. There are several disadvantages to the traditional flatbed method of cultivating baby corn, including excessive water use, water-logged conditions, crop damage, decreased yield, and an increase in weed problems. This results in inefficient use of water, fertilisers, and other inputs as well as decreased yields and profit. The 1–2 days harvest window after silk emergence is crucial for maximising yield and quality, but managing pests and diseases can be challenging.

Raised bed planting (RBP) technology

The RBP technique involves elevating the soil surface above the surrounding ground level and typically enclosing it within

a structure referred to as a raised bed. RBP allows better aeration and nutrient management, resulting higher nitrogen uptake and overall plant health. RBP prevents soil compaction, improve drainage and create a better growing conditions for baby corn.

Advantages over conventional methods

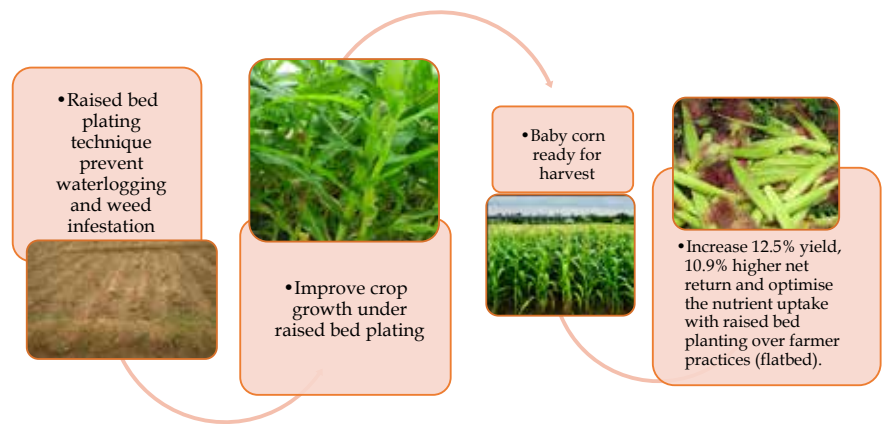
RBP of baby corn has demonstrated considerable higher yield (12.5%) over farmers' practice (flatbed). RBP improves nutrient availability because fertilisers have less contact with soil particles, resulting in reduced nutrient fixation compared to flatbed methods. This technique saves 30–35% water, and also acts as channel to drain excess water under waterlogged situation, lesser effect of salinity over flatbed resulting enhanced resource use efficiency. RBP improves soil aeration, drainage, and root systems of young corn plants, controlling pests and weed growth, making it an effective, sustainable method.

Concept and principles

RBP technology is an attunement of agronomic practice that accelerates excessive drainage and retains sufficient moisture for plant survival and absorption. It incorporates principles of sustainable farming, including minimal soil disturbance, water use efficiency, and better crop-soil management. It reduces weed competition and soil-borne pests, as the beds can be easily managed. Elevated beds prevent water logging, making them ideal for areas with poor drainage or heavy rainfall.

Equipment and materials needed

For the initial preparation of the field, levelling and breaking up soil clumps can be accomplished using a plough or tractor with attachments. Tools such as disc harrows and rotavator are effective for refining soil preparation. Tractors can be fitted with specialised implements (raised bed planter) to form consistent raised beds and furrows. A mechanised or manual seed drill can be utilised for accurate sowing on the raised beds and ensures correct planting depth



Baby corn performance in raised bed planting system

and spacing. Use high-yielding, disease-resistant baby corn varieties and apply fertilisers according to recommendations.

Agronomic benefits

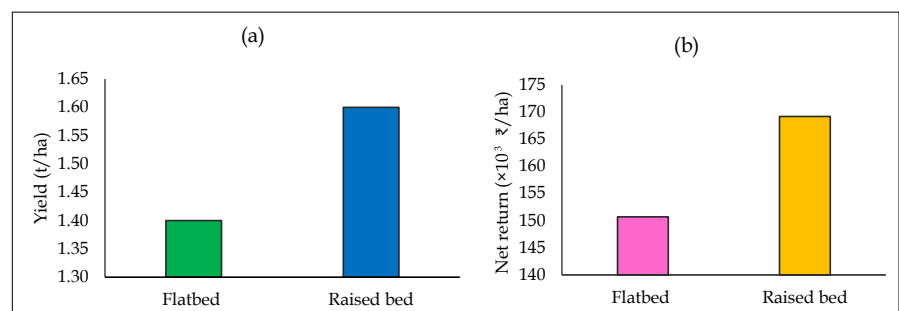
Improved soil drainage: The RBP helps avoid water accumulation by quickly allowing surplus water to escape, particularly in regions that experience significant rainfall or have inadequate drainage. Effective drainage minimises the chances of root rot and various water-related illnesses.

Enhanced soil structure: RBP warms up faster in early spring, promoting quicker germination and better early growth. Baby corn, being sensitive to temperature fluctuations, thrives well in consistent microclimate. Loose, aerated soil in RBP promotes healthy root growth, which enhances nutrient and water uptake.

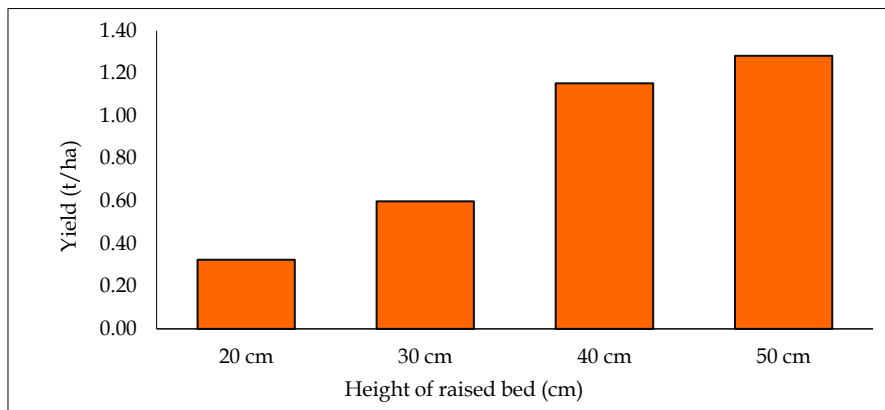
Weed and pest management: Improved aeration and drainage reduce waterlogging, lesser weed growth, and soil-borne pest breeding. Improved root zone aeration helps in seed germination of baby corn, and mulching is suitable for elevated beds.

Enhances yield, profit and nutrient acquisition in baby corn:

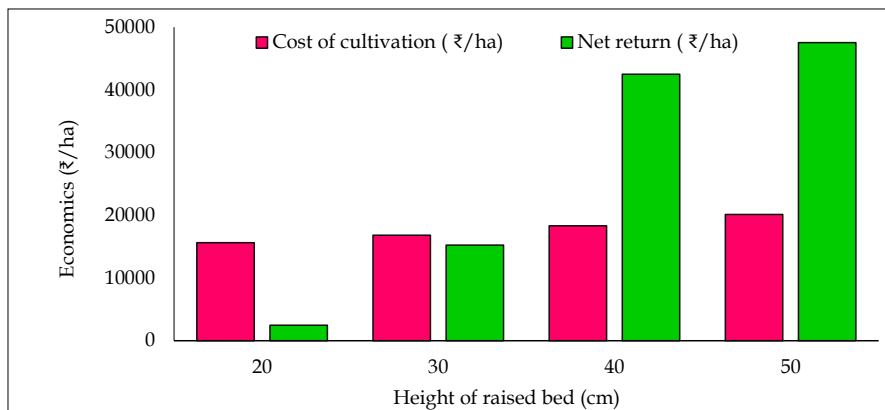
Adaptation of RBP system produced more baby corn yield (1.6 t/ha) (without husk) than the flatbed system (farmer practice) (1.4 t/ha). The magnitude of baby corn yield increase under raised bed planting was by 12.5% over flatbed planting (farmer practice). Raised beds are a conservation tillage tool that enhances plant growth and dry matter buildup, which in turn boosts yields by improving photosynthetic leaf function, fertiliser distribution, surface drainage, and N uptake accuracy. RBP improve soil compaction, erosion, plant nutrient uptake, root health, and water infiltration, thereby increasing crop output and overall productivity. The RBP registered 10.9% higher net return than flatbed. The study found that RBP yielded higher and had lower waterlogging incidences, resulting in higher net return compared to flatbed cultivation. RBP greatly improved the nutrients (N, P, K, S, and Zn) uptake in comparison to flatbed planting. This increase was mostly caused by higher yields of the corresponding applied nutrients (N, P, K, S, and



Impact of planting techniques on yield (a) and net return (b) of baby corn (2 years pooled data)



Effect of land configuration on yield of baby corn



Effect of land configuration on economic returns of baby corn

Zn) in baby corn and green fodder.

Case studies and field trials

Field trials conducted during rainy (*kharif*) season at Research Farm of ICAR-Research Complex of NEH Region, Umiam, Meghalaya have revealed significant improvement in baby corn yield and net profit with RBP in comparison to farmers' practices. The yield of baby corn grew dramatically and linearly as the height of the raised bed increased, reaching 1.28 t/ha at a height of 50 cm. This could be attributed to the plant's rhizosphere,

maintaining optimal moisture levels at a height of 50 cm in the raised bed as opposed to a lower height. The magnitude of baby corn yield increased with 50 cm height of raised bed as compared to 20 cm height. This variation in elevated bed height also affected the values for many economic metrics. Between the various heights of the raised bed, a higher net return (47,554 ₹/ha) was observed at 50 cm. The reason for this could be that a 50 cm increase in bed height resulted in a larger yield, which also offset the preparatory costs of the elevated beds. The net

return was lower by ~94.80% with 20 cm height of raised bed planting as compared to 50 cm height of raised bed planting. It could be because the elevated bed was lower, which led to more water standing and more crop loss from the waterlogged environment. Consider raising the raised bed's height or enhancing drainage to guarantee adequate water flow in order to avoid this problem.

Farmer adoption and acceptance

The implementation of RBP methods in baby corn farming has garnered interest because of its ability to improve yield and promote sustainability. The adoption of this innovation relies on tackling educational disparities, economic challenges, and cultural opposition among farmers. Improved training initiatives and community involvement are essential for promoting acceptance and ensuring the successful rollout of this agricultural advancement.

SUMMARY

The raised bed planting (RBP) method is an effective and eco-friendly strategy for cultivating baby corn, improving crop yield, optimising resource use (water and nutrient) and promoting environmental (energy and carbon footprint) sustainability. Embracing this technique can markedly increase output, establishing it as a favoured option for farmers across various agro-climatic regions.

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