Article: RT0349

Biotica Research Today

Vol 2:9 962/965

2020

Makhana Farming for Maximizing Farm Income: A Success Story

Manoj Kumar[1*], Dibyanshu Shekhar[2], Amba Kumari[2], R. P. Prasad[2] and B. P. Bhatt[3]

[1]ICAR Research Complex for Eastern Region, RCM, Darbhanga, Bihar (846 005), India

[2]Krishi Vigyan Kendra, Jale, Darbhanga, Bihar (847 302), India

[3]ICAR Research Complex for Eastern Region, Patna, Bihar (800 014), India

Open Access

Corresponding Author

Manoj Kumar

e-mail: mkumar_iari@yahoo.co.in

Keywords

Euryale ferox, Fox nut, Gorgon nut, Makhana cultivation

Crop/ Variety: Makhana (*Euryale ferox*)/ Swarna Vaidehi

Name of the Farmer and Address: Dhirendra Kumar, Village: Belwara, PO: Kamtaul, Darbhanga (847 304), Bihar.

Article History

Received in 26th September 2020

Received in revised form 26th September 2020

Accepted in final form 27th September 2020

E-mail: *bioticapublications@gmail.com*

How to cite this article?

Kumar *et al.*, 2020. Makhana Farming for Maximizing Farm Income: A Success Story. Biotica Research Today 2(9): 962-965.

Abstract

In view of the economic importance of makhana (*Euryale ferox* Salisb.), its seed has been deservedly called as 'Black Diamond'. Given its rapidly rising global demand, the crop holds great promise for eastern India, particularly Mithilanchal region of north Bihar. Here we present the success story of a young PhD scholar who, vexed by recurrent flood-induced damages to the traditional cereal crop(s) and fascinated by economic prospect of makhana farming, opted for makhana cultivation in his three hectares of lowland area. Trained at Research Centre for Makhana, Darbhanga, and assisted on-site by KVK, Jale, the student-turned farmer earned an income three to four folds higher than what his family used to earn from the same piece of land. With experience, he further aims to double his farm income by integrating fish farming on the same land, setting an example for the young educated rural youth of Mithilanchal region.

Background Information

Rural educated youth are no longer interested in agriculture due to low remuneration from farming sector. Average monthly income of a farmer's household in Bihar (< Rs. 6,000) is least among all the states in India. It is therefore important to improve remuneration from agriculture in order to attract the young generation to farming. Rice is the most dominant crop in Mithilanchal region of north Bihar. Net profit from this crop is however not so lucrative. Moreover, recurrent floods in the region sometimes inflict total wash-out of the crop, incurring huge financial loss to the farmers. In such a scenario, makhana (*Euryale ferox* Salisb.) could be a saviour for the farmers of this region, with huge abundance of low land areas and relatively higher rainfall during *Kharif* season. Makhana can be grown in fields, ponds and low land areas with water depth ranging from 30 cm to more than 300 cm. Net profit from this crop has also been reported to be much higher than the traditionally cultivated rice and many other crops. Dhirendra Kumar, the subject of this success story, is a PhD Scholar from Lalit Narayan Mithila University, Darbhanga, close to the Research Centre for Makhana situated in the same city. His family, located in Belwara village (Kamtaul, Darbhanga) used to grow rice with a net profit of not more than Rs. 20,000-25,000 per hectare. Furthermore, for past few years, rice crop grown on his three hectares of land (low-lying area) was almost completely damaged due to heavy floods in the region, making it impossible to recover even the input cost. Perturbed by the recurrent flood-induced damages to the rice crop and fascinated by the economic prospect of makhana farming, Dhirendra Kumar opted for makhana cultivation. He attended a "Farmer-Scientist Interaction *cum* Field Day" organized by the lead author of this story at Research Centre for Makhana (RCM), Darbhanga on December 28, 2019. He

learnt technical know-how of makhana farming and obtained makhana seed (variety- Swarna Vaidehi) from the institute. To cover his entire area of 3 ha, a part of the seed required was also supplied by KVK Jale, Darbhanga.

Institutional Interventions by RCM and KVK, Darbhanga

Following technical and physical inputs were provided by the Research Centre for Makhana and the KVK, Jale, Darbhanga for successful cultivation of Makhana by Dhirendra Kumar on his 3 ha of land.

• *Improved Variety of Makhana*: Seeds of "*Swarna Vaidehi*" - the first ever variety of makhana, developed by RCM, Darbhanga, was supplied to the subject jointly by the RCM and the KVK, Darbhanga.

• *Techniques of Nursery Raising*: Since the farmer was growing Makhana for the first time in his field, it was important to raise nursery to reduce the seed requirement to one-third compared to direct broadcasting method. Nursery was raised (immediately after his training at RCM) in the first week of January, 2020, using seed @ 20 kg per 500 m^2 nursery area for transplanting in one ha area.

• *Transplanting Technique*: Makhana seedlings were ready to transplant by early April. Seedlings were carefully uprooted to avoid any major damage to root system, and transplanted at a line to line and raw to raw distance of 1.25 m each.

• *Weeding, Plant Protection and Crop Monitoring*: Weeding was done manually at the early growth period after transplanting and before flowering. Insect pest appearances in the growing crop were reported to the experts (authors) through Whatsapp, as the physical movement of the experts to his makhana field was restricted due to the lockdown caused by COVID-19 pandemic. Solutions were also provided through Whatsapp. However, in the available windows and after the lockdown was lifted, experts from KVK, Jale made visits to his makhana field for monitoring of general crop health and growth.

• *Nutritional Management*: A major point to note in this success story is that the farmer being reported here couldn't use any fertilisers or even organic manures for soil application during field preparation. Clearly, his crop suffered from nutritional deficiency in mid-growth phase. On contingency basis, foliar fertilisation with urea and copper sulphate solution was given to the crop, as suggested by the lead author, who himself had observed the benefits of these foliar fertilisations in makhana in his experimental farm at RCM, Darbhanga.

Results and Outcomes

As a result of the technological interventions by the Research Centre for Makhana, and the KVK, Jale, Darbhanga, the farmer earned an income never experienced on his farm before. From his 3 ha of land, he produced 48 quintals of makhana seed @ 16 q/ha. With a total input cost of Rs. 2,70,000.00, he obtained a gross income of Rs. 5,28,000.00. The net income earned by 3 ha of makhana farming was Rs. 2,58,000.00, implying a net income of Rs. 86,000.00 /ha (Table 1).

Table 1: Summary of the production and income from makhana farming

Sl. No.	Parameters	Values
1	Cost of cultivation/ha (Rs.)	90,000
2	Total cost of cultivation (3 ha) (Rs.)	2,70,000
3	Makhana seed production/ha (quintal)	16.0
4	Total seed production (3ha) (quintal)	48.0
5	Gross income from total produce (Rs.)	5,28,000
6	Net income from total produce (Rs.)	2,58,000
7	Net income/ha (Rs.)	86,000

It's important to note that the productivity of makhana on the farmer's field was way below the yield potential reported for 'Swarna Vaidehi' which is 28-30 q/ha. The reason is amply clear. The subject didn't apply any fertiliser during the land preparation before makhana transplanting. Makhana growing perpetually in ponds thrive on native soil fertility maintained by decomposition of left over plant residues of makhana. In present case, however, makhana was never grown on this piece of land, which was occupied either by rice or left fallow. The farmer even didn't apply any organic manure, so the crop grew solely on native nutrient availability, which can't be expected to meet the entire nutritional requirements of the newly introduced makhana crop, resulting in lower crop yield. However, even the lower for makhana proved much higher for other competing/ alternative crops like rice, when seen from the net income point of view. Dhirendra Kumar admits that the income from rice cultivation (if obtained at all) from the same area of land was not more than Rs. 25,000.00 /ha. That means his income rose three to four folds by switching to makhana cultivation. There remains a lot of scope to further raise his income by adopting integrated nutrient management package for makhana, and by integrating fish farming or including other crops on the same land after makhana harvesting, during September to March. Those interested in commercial farming of makhana can refer to the literature by Kumar *et al*., 2011; Kumar *et al*., 2020; and Singh *et al*., 2020.

Success Point

Technological interventions made by the Research Centre for Makhana, and the KVK, Jale, Darbhanga, resulted in three to four folds increase in farmer's income by adopting makhana cultivation in lowland area situated in Kamtaul area of Darbhanga district. A net income of Rs. 86,000.00 per hectare was obtained in a period of six months,

from a piece of land which suffered perpetually from flood, and never yielded an income more than Rs. 25,000.00 per hectare.

Figure 1: Dhirendra Kumar standing in his makhana field

Figure 2: Dhirendra Kumar showing makhana fruits in his field

Figure 3: Dhirendra Kumar showing his harvested makhana seeds

Figure 4: Dhirendra Kumar with his ready-to-sell makhana seeds

Figure 5: Dr. Manoj Kumar with makhana farmers after the 'Farmer-Scientist Interaction on Improved Makhana Cultivation'

Conclusion

True to its reputation as 'Black Diamond', makhana seeds proved its worth as the farmer reported in present success story earned a net income of Rs. 86,000.00 per hectare by adopting makhana farming using the technological inputs from Research Centre for Makhana, and the KVK, Jale, Darbhanga. The income was three to four folds higher than what the same piece of land was yielding before. As there were some shortcomings in nutrient management aspect of makhana farming, the income can be further improved by overcoming the same. Also, integration of fish culture or inclusion of other suitable crops after makhana harvesting (from September to March) can further push the farmer's income up. On the whole, Dhirendra Kumar proved the economic potential of makhana cultivation and set an example for the rural youth who can adopt makhana farming as a lucrative source of income and livelihood.

References

Kumar, L., Gupta, V.K., Jha, B.K, Singh, I.S., Bhatt, B.P., Singh, A.K., 2011. Status of makhana (*Euryale ferox* Salisb.) cultivation in India. Technical Bulletin No.R-32/PAT-21. ICAR Research Complex for Eastern Region, Patna.

Kumar, M., Raut, S.M., Bhatt, B.P., Kumar, L., 2020. Scientific cultivation of makhana for improving farmers' livelihood in eastern India. Biotica Research Today, 2(7), 670-672.

Singh I.S., Kumar, M., Raut, S.M., Thakur, A.K., Singh, S.P., 2020. Integrated nutrient management package for field cultivation of Makhana in North Bihar. Journal of AgriSearch, 7(3), 138-141.