e-ISSN:2582-7219

INTERNATIONAL JOURNAL OF MULTIDISCIPLINARY RESEARCH IN SCIENCE, ENGINEERING AND TECHNOLOGY

Volume 7, Issue 1, January 2024

INTERNATIONAL STANDARD SERIAL NUMBER INDIA

Impact Factor: 7.54

International Journal of Multidisciplinary Research in Science, Engineering and Technology (IJMRSET)

| ISSN: 2582-7219 | www.ijmrset.com | Impact Factor: 7.54| Monthly, Peer Reviewed & Referred Journal|

| Volume 7, Issue 1, January 2024 |

| DOI:10.15680/IJMRSET.2024.0701017 |

Fish Seed Technology in Rajasthan

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ABSTRACT: Chief Minister Ashok Gehlot recently approved the Rs 2 crore project that will provide each farmer or diggi (water pond) with 1,000 fingerlings of major Indian carps like rohu, catla, and mrigal. The project, announced in Budget 2023-24, has received financial approval recently. Select farmers will be imparted with training on fisheries at the district level soon, a department official said. Rajasthan's water bodies cover about 430,000 water spread area. This is in addition to about 70 rivers and canals covering about 30,000-hectare (ha) area. The state has made steady growth in inland fisheries over the past three decades.

KEYWORDS: fish, seed, technology, production, budget, Rajasthan

I. INTRODUCTION

The area under fish culture and production in the state, which ranks 18th in output, has gone up. About 60 per cent of the total fish production comes from reservoirs, and the rest from tanks and ponds. The productivity of large reservoirs (55 kg/ha) is above the national average. In this year's Budget speech, the chief minister had announced to set up the Brackish Water Aquaculture Laboratory in Churu district to promote shrimp farming. "Work is going on," the official said. The government is promoting innovations in the tribal sub-plan area under the livelihood model in Jaisamand Dam in Udaipur, Kadana backwater in Dungarpur, and Mahi Bajaj Sagar in Banswara. In these areas, the government is focusing on the creation of livelihood for tribal fishermen. Besides this, the department is paying fishermen .[1,2,3]

In Banswara, Rajasthan fish production and its demand is growing in recent years. Mahi dam is largest water body in Vagad region. All varieties of fishes occurred in mahi dam. Environment for fish production in southern Rajasthan is excellent. The need for the production of quality fish seed for stocking the fish ponds and natural water bodies has indeed increased steadily (Brain and Army, 1980) [2]. For fish production collection, selection and manipulation of breeders required. The numbers of nursery, rearing and production ponds for a hatchery depend on the number of fry and fingerlings expected from the hatchery (Ayinla and Nwadukwe, 1988) [4]. The knowledge about water quality parameters like ph, alkalinity and DO, feed (natural and artificial), resistance to diseases in fish is required most. For successful production of fish water quantity, transportation and fish food demand is necessary.

In hatchery for labeo and pangasius species well growth, environmental factors are very sui. The breeding of labeo and catla is performed in farm and fry and fingerlings are distributed to the farmers. Pangasius is also favourable fish seed for farmers. Composite culture is in best practice for fish seed and food for people. Some of these fishes are. Labeo Rohita.♣ Catla catla.♣ Pangasius pangasius.♣ Tilapia mossambica.♣ Hatchery construction Hatchery needs flowing water with affordable temperature during the breeding season. The hatchery tanks or pond provide stimulating environment to ripe brooders for induced spawn. Pipes for outlet and inlet water system serves for regulating the water level. A fish farming centre divided into different fish ponds. 1. Breeding pond 2. Hatching ponds 3. Nursery ponds 4.

Rearing pond
Breeding pond Ponds of size oval shape with 1.0 to1.5 meter and depth 2.0 to 5.5 with cemented uniform side slope and bottom with liming and fertilizing (exposed with sun) with controlled pipe system for complete drainage of inlet and outlet of water were selected (3). Air and sunlight exposure needed for proper movement and healthy environment. Its surrounding should be getting sufficient wind action and exposure to bright day light for 6-8 hrs in a day for at least 2-3 months from January to February onwards. This quantum of exposure and a moderate range of water temperature (27-32 ºC) seem to be optimum and quite inductive for rapid growth of gonad of fish. Proper selection of brooder fish for induced breeding is the first step. Female healthy breeders of Catla, rohu, mrigal, grass carp and common carp of above 2 years age group and weight range are normally up to 2 kg selected. Hatching ponds These are the small tanks usually of 8x4x2 feet and are used for hatching the fertilized eggs. These are located near the brood pond. (4) A continuous but slow flowing water is desirable for aerating the eggs. The tanks are fixed up with happa called hatching happa made of coarse cloth of mosquito curtain cloth. For survival and growth of eggs and larvae, physicochemical and microbial parameters of water should be tested properly. Fig 4: Hatching pond Fig 5: Nursery pond Nursery pond These are 50x50x4 feet. Young fry about 3 to 5 days old are transferred from spawning ponds to nurseries, where they remain for

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about 30 days. (5) This involves the collection of male and female gametes for artificial fertilization or the collection of fertilized eggs from spawning mats, heaps and spawning receptacles; incubation of fertilized eggs, hatching and maintenance of hatchling (Nwadukwe et al., 1991) [4] . Rearing pond – such ponds may be seasonal or perennial of 90x30x4 feet in size and are used for rearing advanced fry for 2-3 months.
Stocking pond Stocking pond size may be 300x88x6 feet or about an acre. (7.) Stocking of fingerlings of various major carps in the ratio of 3:3:4 (Catla, Rohu and Mrigal) is done successfully with a survival rate of 70-80%. While stocking, the principle to be kept in mind is that the area of 1m² is needed to attain an average weight of 1 kg per year. Fig 7: Stocking pond Aerators and Diffusers Aeration is important for hatchery systems. This instrument is in available in floating and static pumps and used to circulate the oxygen into water. (8. & 9.). Fig 8: Aerators and Diffusers Fig 9: Aerators and Diffusers Fish Feed Three types of food used in fish ponds: natural food; supplementary feeds, and complete feeds. 1. Natural food: Natural food is found naturally in the pond. It may include plankton (Spirulina, Oscillatoria, and chlorella), worms, insects, snails, aquatic plants (Hydrilla, Vallisneria, Najas, Utricularia, and Eichhornia) and fish. Their abundance greatly depends on water quality. 2. Supplementary food: The mixture of rice, pulse, oil cake, cattle dung, fish meal is fed to Catla, Rohu, Mrigal and Common carp. This mixture is available in terrestrial plants, kitchen wastes or agricultural by-product. Fish food must be easy to eat and digest. Feeding increases fish production from the water body and makes farming profi. For better results Feeding with powered cotton-seed, containing vitamin-E promotes gonadal maturity in fishes. 3. Complete food: This mixture is [4,5,6]made of selected ingredients to provide all the nutrients necessary for the fish to grow well. These feeds are quite difficult to make on the farm and are usually quite expensive to buy.

Breeding Induced breeding produces seed of much greater consistency and fish can be spawned on demand when it matures. It also provides ample opportunities for stock improvement by selective breeding. In hatchery farming brood stocks are maintained in separate ponds. Brood fishes are injected with inducing hormones in hapa breeding (3. Breeding pond). Both the males and females are injected synthetic hormones (Ovaprim or Ovatide). These synthetic hormones are administered @ 0.1-0.4 ml/ kg female and 0.2-0.4 ml/kg male. Fish Seed Hatchery The source and means of procuring fish seed directly influence the production of fish from fish culture. It provides for fish eggs to develop and hatch by maintaining proper water temperature, oxygen levels, disease control, food and protection from predators. The production of eggs, larvae and fingerlings in a hatchery depends on the number of hatch able eggs, survival and growth rates of the larvae (Charo and Oirere, 2000)

Complete hatching facilities of fish farm are needed to produce the fish seed. Natural conditions and proper management can obtain higher percentage of brood stock. Separate fish ponds with plenty of water, food and physicochemical parameters (ph, alkalinity and dissolved oxygen) for rearing of offspring obtained breeding, monitoring, growth and maturation in desired fish seed in adequate quantities are needed. Fish food is very important for India's growing population. Fish farming earning is beneficial for unemployed people. Fish is important for health. In fish hatchery requirement water and transportation facilities availability is necessary. Fish farm employee must have knowledge of pond construction and management, expert in induced breeding and hypophysation. Fish seed distribution provide good opportunity to farmers to produced fishes in hatchery[7,8,9]

II. DISCUSSION

Rajasthan government has sanctioned a Rs 2 crore project, greenlighted by Chief Minister Ashok Gehlot, aimed at providing free fish seeds to 20,000 farmers. Each farmer or water pond (diggi) will receive 1,000 fingerlings of prominent Indian carp varieties, including rohu, catla, and mrigal. This initiative, outlined in the Budget for 2023-24, recently secured financial approval.

Training sessions on fisheries will be conducted at the district level for selected farmers to ensure effective utilization of the provided fish seeds. Rajasthan boasts extensive water bodies covering approximately 430,000 hectares, complemented by about 70 rivers and canals spanning around 30,000 hectares. Over the past three decades, the state has witnessed consistent growth in inland fisheries.

While Rajasthan currently ranks 18th in fish output, the area dedicated to fish culture and production has experienced a noteworthy increase. Large reservoirs contribute about 60% of the total fish production, with tanks and ponds making up the remainder. The productivity of these reservoirs exceeds the national average at 55 kg per hectare.

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In line with the commitment to fisheries development, Chief Minister Gehlot had announced the establishment of the Brackish Water Aquaculture Laboratory in Churu district during this year's Budget speech. Ongoing efforts are in progress to materialize this initiative.

The government is actively promoting innovations in tribal sub-plan areas, focusing on livelihood creation for tribal fishermen in regions such as Jaisamand Dam in Udaipur, Kadana backwater in Dungarpur, and Mahi Bajaj Sagar in Banswara. These efforts underscore the commitment to sustainable fisheries practices and economic empowerment in the state.

Jaipur is becoming one of the well known place when it comes to get trained or doing fish farming through Biofloc Fish Farming system.

Biofloc system [10,11,12]is one of the innovative fish farming system in which you can produce or stock fishes in high density.

Whereas in Traditional Fish farming system (Pond fish farming System) you can produce approx. 5 Ton in 1 acre of land on the other hand in intensive Biofloc Fish Farming System you can stock fish in high density and can get upto 500 kg of biomass from Every 10000 ltr Biofloc tank easily.

Fish farming is becoming another hot trade in Rajasthan as well as other states which are till date involved in Traditional farming. Farmers have been started searching a few other farming options which they can do along with the traditional farming so that they can use the available resources but can earn more as traditional farming is not much paying business now a days.

Rajasthan Govt. Is Planing To Open The Doors for Fish Farming In Rajasthan

Govt. of Rajasthan is Planing to start Biofloc Fish Farming Training in Rajasthn as it has potential and even small farmers can get good returns with small investment being at their native place using the available land and resources.

Farmers and anyone who wants to start Biofloc Fish Farming in Rajasthan will not face any issues related with availability of raw material which is required for successful fish culture.

III. RESULTS

Rajasthan is the largest state of India constituting of 10.4 per cent of the country geographical area. Rajasthan is a landlocked border state of India, sharing the country's frontier with Pakistan in the west and northwest. Rajasthan has the vast and significant amount of water resources in the form of reservoirs, ponds and tanks, rivers, canals and waterlogged areas with huge but largely underutilized and untapped potential for fish production and livelihood development [1, 8] . Freshwater, as well as saline water resources are available in the state, among which 4.23 lakh ha freshwater area excluding 30000 ha area as rivers and canal system, 80000 ha waterlogged and 1.80 [13,14,15]lakh ha salt affected/ land saline area at full tank level [1] . Particularly Bhilwara, Sri Ganganagar, Banswara, Chittorgarh, Tonk, Ajmer, and Udaipur district have more than 25,000 ha each of FTL (Full Tank Level) area comprise 67% of total resource area. Based on resource characteristics and their potential for fisheries development, districts were grouped into three categories. There are 9 Districts with Higher Potential namely Banswara, Dungarpur, Chittorgarh, Bhilwara, Udaipur, Sirohi, Jhalawar, Kota and Ganganagar which has 60 percent total Effective Water Spread Area (EWSA) and 45 percent of total water bodies [8, 10]. There are 14 districts with moderate potential namely Bharatpur, Dholpur, Alwar, Karauli, Sawai Madhopur, Dausa, Rajasmand, Pali, Tonk, Ajmer, Jaipur Bundi, Baran and Hanumangarh having 35 percent of total EWSA and 39 percent total water bodies. There are 9 districts with less potential like Jhunjhunu, Jalore, Sikar, Churu, Barmer, Nagaur, Bikaner, Jodhpur, Jaisalmer having only 5.5 percent of total EWSA and 17 percent of total water bodies [6-8, 12] . Resource wise average productivity per ha area is 56 kg for the large reservoir, 176 kg for the small and medium reservoir [1]. Productivity from the reservoir is above the national average, while the productivity of small water bodies is far less than the national average with 286 kg for large tanks, 1125 kg for medium tanks and ponds, 1675 kg for small tanks, ponds and 2050 kg for ponds of water-logged areas. From limnological and productivity point of view, water circulation is almost continuous round the year (Polymictic), this obviously helps in rapid turnover of nutrients, thereby resulting in higher biological productivity [11, 15] . The fish production has grown with an compound and annual growth rate of respectively 7.98% and12.33% in the last 17 years,

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fish production was 54,035 tons in 2017-18 [2, 4, 8] . Around 50,000 farmers/ fishers are engaged in direct and indirect fisheries-related activities.[16,17]

Only 35-40 per cent of the total water areas full tank level (FTL) utilized for fish culture with an average productivity of 208 kg/ha, shows the potential for further development of capture and culture fisheries in Rajasthan [10]. Inline of the earlier reported study, the present study was aimed to assess the factors affecting fish production and its potential in Rajasthan.

The fish production trend was based on the data pertaining from the period of 2001-02 to 2017-18, Fish production in the state has an increasing trend with increasing rate. Though the growth rate was miserable in the year 2013-14, where small tanks and ponds dried due to less rainfall in the state. In the last 17 years' fish production has increased with the annual compound growth rate 7.98 % and 12.34 per cent average growth rate, the above figure shows that association between fish production and fish seed production, from the year 2012 fish production has increased with the increased seed supply in the state. Mostly the fish production comes from the capture fisheries, excluding few fish farms in districts namely Bharatpur, Udaipur, Banswara, Dungarpur, Hanumangrah. Whether a water body is utilized for fish culture or not mainly depend on the lease status, mostly large reservoirs were given on lease because of availability of water throughout the year, and mostly state focus on the fisheries resources to generate revenue not for the livelihood sources or welfare of the local people. Fish culture practices in Rajasthan do not follow the established scientific management practices except in a few cases of Dist, Banswara, Bharatpur
The correlation matrix among the different variables such as available water area, seed production, and no. of fish seed hatcheries available in the districts, was having association ship. Fish production was associated with an available water area, seed production, no. of hatcheries available. Which means when available water area, seed production, no. of hatcheries available will increase the fish production of the state would increase considerably. Seed production was having a correlation with available water area for fisheries in districts. This may be due to the availability of more water area in districts the more no of natural spawning ground or seed collection site would increase such as perennial bunds, seasonal bunds. Closer analysis with a different variable the seed production and the available no. of seed production hatchery were having a highly significant correlation

Closer analysis of the variables by applying correlation regression (2) of parameters such as seed production and no. of seed production hatcheries was found as the highly affecting component to fish production of the state. This was due to the non-availability of fish seed at the right time and good quality seed, fish seed demand in the state 1216 million fry every year [10]. The total average seed supply is only 40 per cent of the estimated seed requirement in the state. Rajasthan has a huge deficit of fish seed at present only 25 per cent of the present seed supply is met within Rajasthan, with as much as 75 per cent of its total seed supply met by imports from other States. Further, there are 2 government hatcheries/seed farms exist in the state, and seed farms spread across the 16 districts in the State, while another two are owned by DOF but leased out to private parties on contract, only 10 farms/hatcheries are functional. Out of 28 farms, only 11 have hatchery facility (with spawn production capacity of 150 million) while the rest have only rearing space though in some hapa breeding is claimed to be practiced. The total production capacity of all hatcheries and seed farms with DOF is 86 million fries [1, 8, 10] . Availability of water resource in the state was found not significant with fish production, this was due to the vast no of water bodies were available, but only 35-40% of the water bodies were utilized to fisheries [4, 10]. With these factors, some other factors like as no. of the cadre's staff in the fisheries department. For a technical department, the very low proportion of technical cadre that too with 39% vacancy is a matter of serious concern [8]. This is hugely inadequate compared to the extent of resources and the developmental challenges. Some other types of problems were also seen like as, water availability to maintain a minimum level of water in the ponds for the fish during the lean months. The financial capital was another major problem in most of the sites. There is no effective fishermen's association in for the improvement of this kind of activities. There is no proper[18,19] leasing policy to increase production. Lacks of infrastructure development were observed like cold storage, marketing structure, roads, transportation, labor etc.

IV. CONCLUSION

To increase the area under fish culture the government should collaborate with FFDA (Fish Farmers Development Agency) or MNREGA (Mahatma Gandhi National Rural Employment Gurantee Act) and other pluralistic extension services provider organization Government organization, Nongovernment and private organization. The fisheries development programs should strengthen aquaculture extension and market-led extension in the state. Henceforth, to cater these problems the government should redesign the organizational structure of the fisheries sector accordingly. Development of hygienic and modern fish markets in all districts having high and moderate potential for fisheries.

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Encourage setting up of ice plants /cold storage plants in the private sector through subsidies for year-round availability. Empowerment: awareness generation, training, and capacity building. Training programs of 5-10 days each in the following areas for different Districts groups of carefully identified farmers/fishers, both on-site and off-site.[20]

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INTERNATIONAL STANDARD SERIAL NUMBER INDIA

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