



## Use of an IPM Tools in Trapa Cropping and their Negative Effects on Fish Culture and Human Health

### KEYWORDS

agro ecosystem, trapa culture, fish culture , Integrated Pest Management strategies

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**ABSTRACT** *The total 0.63 lakh water area is available in the state in the form of village ponds and tanks. Trapa and fish culture are an integral component of rural development programme . Interest in Trapa cropping, a traditional tool of pest management, has increased considerably in recent years. A widely used Organo phosphate pesticide in the trapa culture extremely dangerous to fish. May be harmful to humanlife . Adverse effect on the water quality of the Banjarha pond was recorded due to the use of tobacco and pesticide for trapa. A reason was responsible for disturbance of hydrological condition of pond , causes of Epizootic Ulcerative Syndrome (ESU) diseases, used of tobacco and pesticide for Trapa culture , spray of oil emulsion mixed with synthetic detergent .*

### 1. Introduction:

Trapa cum fish culture is an integral component of rural development programme in Madhya Pradesh. It is gaining importance day by day for its potential of employment and income generation. It caters primarily to the needs of socio-economically weaker and backward communities of fishermen, scheduled caste and scheduled tribe which constitute the poorest section of the society. Madhya Pradesh is one of the land locked state blessed with vast potential aquatic resources in the form 2.92 lakh ha. of reservoirs, 0.57 lakh ha. of village ponds and tanks.

The decaying of trapa crop also add nutrients in pond and its serves as food for fishes. Trapa culture and worship waste materials accelerates plankton growth due to continues culture of Trapa high eutrophication have been noticed, which should be cleared by desisting (Tripathi and Sharma, 2003; Chaudhary and Shinde, 2009). The kernel of water chestnut contains a large amount of protein (up to 20%), starch (52%), tannins (9.4%), fat (up to 1%), sugar (3%), minerals, etc. It is also a good source of fibre and vitamin B along with Ca, K, Fe and Zn. But it needs little application of phosphorus and potassium. It can thrive well under a pH range of 6 to 7.5. Growers from different parts of the world uses dolomite (a form of lime that contains magnesium) to adjust pH is which one of the most important works during nutrient management practice .

The selected water bodies are Banjarha and Matehna ponds situated in Sohawal block of Raghurajnagar tahsil of Satna district other is located Lakoda tank at Lakoda village in district of Ujjain. Thus, it may be concluded that the water bodies are certainly suitable for carps and aquaculture on the basis of eco based planning and judicious management is possible. Synthetic detergents have become one of the important contributory substances that create pollution in natural water systems (Gupta et. al. 1989). Toxicological im-

pacts of synthetics detergents have been well documented by many workers (Henderson et. al. 1959; Abel, 1974 ). Use of fertilizers in every water bodies that effect sometimes changed concentration confirm by Alikunhi, (1957), Banerjee et. al, (1969), Jayapala, (1986), Sharma and Saini (1990,91) Saini and Sharma (1992) Schroeder and Herpher (1976).

Atleast 50% of the total food of carp in fishponds must come from the water bodies itself. Just as land crops can usually be improved by the application of fertilizers, even when the water bodies are already productive, . The overall fish productivity of water bodies used pesticide and tobacco for trapa culture (*Trapa bispinosa* ) and fertilizers and supplementary feeding was considerably good. Acute exposure to extremely high levels of Organophosphate , have cause body-wide symptoms whose intensity would be dependent on the severity of exposure. Possible symptoms include skin and eye irritation, cramps, nausea, diarrhea, excessive sweating, seizures and even death. Most symptoms tend to resolve within several weeks . The recent resurgence of interest in trap cropping as an IPM tool is the result of concerns about potential negative effects of pesticides on human health and the environment, pesticide resistance, and general economic considerations of agricultural production .

### 2. Materials and Methods:

#### 2.1 Background:

The total 3.94 lakh ha. water area available out of which 3.49 lakh ha. of water area brought under fish culture which is 98% of total water area available. The present fish productivity of ponds in the state is 1512 kg/hac./yr, mainly of Indian major carps i.e. Catla, Rohu, Mrigal, Grass Carp, Common Carp, Silver Carp are being cultured in the water bodies.

The water resources and other data's are available in comparison among the India , Madhya Pradesh and selected water bodies have been classified on the basis of Fisherie development, and trapa culture which are as follows in table 1 :-

**Table 1 : Comparative figure's of different water bodies**

No.	Item	National	MP	Banjarha Pond	Matehna Ponds	Lakoda Tank
1.	Inland water area for fish culture (in lakh ha.)	73.59	3.94	0.00005068	0.0000416	0.00110
2.	Fish Production (in metric tonne)	34,57,890	85,235	6	5.9	50
3.1	Fish seed production (standard fry in lakh)	1,92,314	7,989	Nil	Nil	Nil
3.2	Fish seed stocking (standard fry in lakh)	—	—	0.000060	0.000050	0.000120
4.	Number of Fisherman co-operative societies	11,847	2,061	Individual	Individual	2
5.	Number of members in Fisherman co-operative societies	19,17,305	69,937	1	1	133
6	Number of fisherman	3482530	1,67,380	1	1	133

## 2.2 Fisheries Policy of the State:

Under the devolution of power of the Panchyats the State Government has transferred rights of management of reservoirs up to 10 ha. to the Gram Panchayats 10 ha. to 100 ha. to the Jan pad Panchayats and 100 ha. to 1000 ha. to the Zila Panchayats and 1000 ha. to 2000 ha. of water area will remain under the control of Department of Fisheries / Fisheries Federation. The reservoirs, having more than 2000 ha. average water spread area, have been transferred to the M.P. Fisheries Co-operatives Federation for development of fisheries therein, which is an apex body of the primary fisheries co-operatives. The Panchayat Raj bodies lease out the fishing rights of small reservoirs and tanks to the local fisher co-operatives on long term lease basis. But there is no policy was made by the MP govt. for the leasing of trapa culture.

As per the state policy, management of water bodies under the Three-tier Panchyati Raj System are as follows in table 2:-

**Table 2 : Different water bodies leasing criteria in MP**

No.	Category of Water Bodies (in hectare)	Management Authority
1	0 – 10	Gram Sabha
2	> 10 – 100	Janpad Panchyat
3	> 100 – 2000	Zila Panchyat
4	Above 2000	M.P. Fisheries Federation

## 2.3 Fish seed and fish production in MP:

- An increase in fish culture area from base year 2006-07 till the end 11<sup>th</sup> Five Year Plan (2007-12): From 3.14 lakh hectare to 3.74 lakh hectare
- An increase in fish seed production from base year 2006-07 till the end of (2008-09) – From 5,000 lakh standard fry to 5,500 lakh standard fry and by the end 11<sup>th</sup> Five Year Plan (2007-12)- to 6,300 lakh standard fry (22 % increase).
- An increase in fish production from base year 2006-07 till the end of (2008-09) –From 66,000 tonne to 69,000 tonne and by the end 11<sup>th</sup> Five Year Plan (2007-12)- to 74,000 tonne (19.23 % increase)

## 2.4 Culture Practice:

About 70 to 80% of village ponds are seasonal in nature . The present fish productivity of ponds in the state is 1512 kg/ hac./yr, mainly of Indian major carps i.e. Catla, Rohu, Mrigal, Grass Carp, Common Carp, Silver Carp are being cultured in the water bodies. Trapa (*Trapa bispinosa*) is seasonal, aquatic cash crops which are grown extensively in Madhya Pradesh respectively and maximum ponds are used for trapa cum fish culture practices.

Banjarha pond (Pond A) is surrounded by agriculture fields and open area. The total area of the its pond is 5.068 ha. Its water is used for fish & trapa culture, bathing, cleaning of clothes, domestic and for animal drinking water.

Matehna pond (Pond B) is located about 15km. from Satna and situated at Matehena village, which is near Madhavgarh and 2km. from Satna – Rewa road. The total area of Pond B is 4.160 ha. Its water is used for drinking, bathing, cleaning of clothes, trapa and composite fish culture.

Lakoda tank(Tank A) is situated 16 km from Ujjain, its area is about 110 ha. Its water is used for trapa, water melon and fish culture, irrigation , bathing etc. Water melon seed production is 109 kg/ha/yr , it is selling in seasonally this is extra income of fisherman. This water bodies is a ancestral irrigation tank today it is desilting by clay.

## 3. Observation :

In above water bodies trapa fruits ripen in winter and are harvested from November to January. A production of 1500-2000 kg/ha/yr of fruits is obtained. Fish are harvested in regularly when its production is 1200 to 1500 kg/ha/yr. Above yields are average of selected water bodies.

The values of pH have been observed to be ranged from 5.5 to 8. Its minimum values were noted in March and May and maximum in February in each water bodies.

Total Alkalinity ranged from 80.0 to 260.0 mg/l. Highest and lowest concentration of total alkalinity noted the same in each water bodies during winter and during summer season respectively.

Trapa production was to be seen economically in each water bodies, but it is to be seen in totally detrimental to fisheries (Gupta,2004). It also thrives in the soft nutrient rich waters in lakes, ponds and streams with a neutral to slightly alkaline pH. The plant is well adapted to life at the water's edge and prospers even when stranded along muddy shores. Toxicity tests on the effect of tobacco dust against fish. The nicotine content of the tobacco dust used was 2.8.The effective application rate is affected by the nicotine content of the tobacco dust.

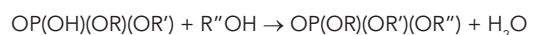
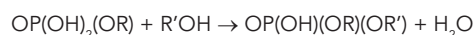
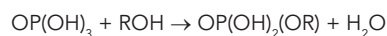
## Discussions and Results:

The pH below 7 indicates that the water sample slightly acidic which may be due to the wide spread use of pesticide, tobacco and various fertilizers in the nearby agricultural lands. The alkalinity concentration (except summer) of each water bodies is suggestive of the high productivity levels of the ponds and tank . Adverse effect on the water quality of the Banjarha pond was recorded due to the use of tobacco and pesticide for trapa.

Accordingly with judicious management, particularly when hydrological conditions of Lakoda tank and Matehna pond are favorable in comparison with Banjarha Pond for carps fishes productivity. A reason was responsible for disturbance of hydrological condition of Pond A, causes of Epizootic Ulcerative Syndrome (ESU) diseases, used of tobacco and pesticide for Trapa culture , spray of oil emulsion mixed with synthetic detergent (in fish seed nurseries, which are in pond A). The dreaded fish disease, Epizootic Ulcerative Syndrome (ESU) has been causing considerable damage to the inland fisheries of Asia-Pacific region for last two decades. This disease cover the whole Southeast Asia (Roberts et. al. 1992 ) and entered into the subcontinent during 1988 (Jhingran, 1988). Efforts to control the disease have met with varying degree of success. Application of lime and salt (Jayaraman, 1991; Sinha, 1991; Das, 1992 and Bhaumik et.al. 1993), Potassium permanganate (Das and Das, 1993) and ash (De, 1991) have been tried as curative agents.

A widely used Organo phosphate pesticide in the trapa culture. Its chemical composition Monocrotophos a.i.36%w/w, other related ingredients 64% w/w. It is recommended to control insects pests of trapa.

Organophosphates are widely employed both in natural and synthetic applications because of the ease with which organic groups can be linked together. Being a triprotic acid, phosphoric acid can form triesters whereas carboxylic acids only form monoesters. Esterification entails the attachment of organic groups to phosphorus through oxygen linkers. The precursors to such esters are alcohols. Encompassing many thousands of natural and synthetic compounds, alcohols are diverse and widespread.



- to synchronize the pest attack with its natural enemies, with weather conditions that are adverse for the pest or with the abundance of an alternative host and human life.
- to make it possible to destroy the crop before the pest enters diapause damaging the pest in its soil inhabiting phase, e.g., wireworms;



Lakoda tank with chestnut fruits.



Coloured Water chestnut fruits with endocarp

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