

PREFACE

“The culture of rainbow trout has become a well-established industry throughout the world for both commercial production and recreational fishing purpose.”

—Barrington (1983)

Nepal, a sub-tropical country, which is spread in the surface area of 147181 square kilometres and which lies in the latitude between 80 to 88 ° E from east to west, longitude between 26 to 31 ° N from north to south and altitude between 66 to 8848 masl from south to north, is divided, from south to north, into three physiographic regions – lowland or plain terai, mid or high hills and highest or greatest mountains, the Himalayas. The terai lies between 65 to 500 masl in the south, lower hills up to 2700 masl and upper hills up to 4000 masl in the middle, and the highest Himalayas above tree line, that is, > 4600 masl in the north. The terai region comprises 17%, the mid hills 40% and the high mountains including the Himalayas 43% of the total area of the country.

Therefore, the majority of the area of Nepal is covered by hills and mountains that constitute about 83% of the total area. The Himalayan state with such hills and mountains has tremendous water resources having multiple potentialities for various uses of water. Among them, water resources of these regions have a higher potentiality for coldwater fish that can be reared well in both the areas – mid-hills and high mountains.

As, Nepal is, geographically land-locked, it is completely deprived of sea. So, it has only freshwater aquatic habitats, both lentic (pond, pool, ditch, reservoir, daha, nullah, swamp and so on) and lotic (spring, fountain, rivulet, stream, river and river-system) comprising 7.06% of the total area of 143,181 square kilometers. The country is rich in

its inland water resources which are around 6000 rivers originating from high hills and mountains. The rivers and their system constitute about 49 percent of the total area of the water resources. Due to the 7.06% of water resources in the total area of the country, Nepal has been privileged as being the second richest country in water resources after Brazil.

Because of the altitudinal variations, the freshwater of Nepal delivers coldwater, running in the high altitudes in the hills and mountains and warm water, flowing in the lowland terai. Since, Nepal has great diversity in physiography, climate, land, altitude, and water resources, it has wide scopes in medicine, biodiversity, forestry, tourism and agriculture. As, it is a developing country, income generation of its people solely comes from tourism and agriculture. Although, tourism is developing day by day, hardly one percent peoples are associated. However, in agriculture which is comparatively developed than tourism, 90 percent peoples are engaged; hence, it is referred to as an agriculture country. Agriculture, in Nepal, contains cereal culture, leguminous culture, cash crop culture, horticulture, animal husbandry including aquaculture.

Aquaculture, that is, pisciculture, shell-fish culture and makhana (= *Ipomoea*) culture, a small sub-sector of agriculture in Nepal, contributes about 0.23% in Agriculture Gross Domestic Product (AGDP) and 0.09% in Gross Domestic Product (GDP). The pisciculture constitutes about 95% of the total aquaculture in Nepal. Hence, the contribution of pisciculture in AGDP and GDP is remarkable. Here, pisciculture comprises carp culture, tilapia culture, catfish (= *Clarias gariepinus*) culture, live fish (= *Channa striatus*) culture, ornamental fish culture and trout culture and the shellfish culture furnishes prawn (= *Macrobrachium rosenburgii*) culture. The carp, tilapia, catfish, live fish, ornamental fish and prawn culture are done in warm water and trout culture in the coldwater of Nepal. Because carp culture dominates over prawn culture

and trout culture, so the contribution of trout culture in AGDP and GDP is negligible, that is why, the contribution of trout production in AGDP and GDP is automatically meagre. To increase this, a species of trout is required. Because, among the exotic coldwater species, rainbow trout is widely cultivated salmonid throughout the temperate world, it has been selected to be cultivated in Nepal as indigenous trout are still in the way to research. So, the trout culture owes the culture of a single exotic species of rainbow trout in the country in some of its coldwater.

Rainbow trout prefers cold and high oxygen content water for their survival and growth which are abundant in Nepal, particularly in the hills and mountain areas that are having a slopping of 1 to 3% for permitting adequate water discharge for rainbow trout production. The contribution in the production of rainbow trout can be increased with the help of three main components like water quality, continuous seed supply and artificial feed.

Of all the components of rainbow trout culture mentioned above, artificial feed alone seems to be a governing factor in terms of survival and growth. Because, the cost of artificial feed is very high as it contains highly costly animal proteins of fishmeal or shrimp meals and costly plant proteins of soybeans, the production cost goes up so, the small scale farmers are not daring enough to cultivate the rainbow trout. Therefore, to decrease the production cost of rainbow trout, the feed cost must be decreased. Hence, the research for some low cost, easily available, nonconventional and substitute animal proteins and alternative to animal proteins becomes necessary for which this research assignment was taken.

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“The artificial feed is the single largest operating cost in rainbow trout culture in the world including Nepal. The artificial feed alone is 76% of the total variable cost and 40% of the total production cost of rainbow trout farming and is one of the major constraints after seed supply to limit expansion of rainbow trout cultivation in Nepal.”

- Nepal et al. (2002)
