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# PRESENT STATUS AND PROBLEM CONFRONTATION OF DYKE VEGETABLE PRODUCTION AT FRESHWATER GHERS OF BAGERHAT DISTRICT IN BANGLADESH

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**A B S T R A C T**

The water-bodies of shrimp/prawn farm are known as “gher” and the embankments of the gher are known as “Dyke”. Recently, vegetable production on the Dykes is gaining popularity in the southwest coastal region. The main purpose of the study was to identify the present status of Dyke Vegetable Production (DVP) in gher and to determine the problem confrontation associated with DVP. Data were collected from randomly selected 84 respondents (50% out of 168 gher owners) of five selected villages of Mollarhat upazila under Bagerhat district, through face-to-face interview using a pre-tested interview schedule during February to April, 2018. Collected data were analyzed by using SPSS software for different statistical techniques and for obtaining results and subsequent interpretation for satisfying the mentioned purpose of the study.Most (86.9%) of the respondents had medium to large sized Dykes, and thus the respondents could bring their Dyke area under vegetables cultivation instead of keeping fallow year after year. The gher owners harvested on an average 218.47 kg vegetable and earned 3,383.807 Tk. annually from one decimal Dyke area which is an additional income. The gher owners who have large sized Dyke in ghers continued production due to high quantity of cumulative profit. About half (51.19%) of the respondents grown lady’s finger in the Dykes during lean period followed by brinjal (48.81%) and tomato (47.61%). The respondents produced 53,962.09 kg $ha^{-1}$ which is completely extra production contributing to food security. A number of 29 problems were identified as confronted by Dyke vegetables growers with different extent of severity. The most severe problem in Dyke vegetable farming in the study area was “lack of technical knowledge for identification of diseases”. Most of the respondents (96.4%) belonged to medium problem confrontation category. Among 13 selected characteristics of the respondents only annual family income showed a significant positive relationship and extension contact showed a negative significant relationship with the problem confrontation. The gher owners confront medium problems and appropriate measures should be undertaken to reduce these problems as minimum as possible.

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## INTRODUCTION

The coastal region of Bangladesh covers almost 29,000 km$^2$ or about 20% of the country and more than 30% of the cultivable lands of the country (Haque, 2006). About 53% of the coastal areas are affected by salinity. Agricultural land use in these areas is very poor, which is much lower than country's average cropping intensity (Rahman, 2012).The region suffers from a range of problems, the most notable of which is soil and water salinity. The topsoil of nearly 223,000 ha of coastal arable land (27% of total cultivable land in the region) has been affected by various degrees of salinity during 1973-2009 due to decreasing freshwater flows of upstream rivers, an erratic rainfall pattern, the rise of brackish-water shrimp culture, tidal flooding, and capillary rise of dissolved salt (Kabir et al., 2015). Shrimp farming has contributed significantly to the national economy through foreign exchange earnings and generating income, employment, and food for coastal dwellers of Bangladesh. However, there have been severe environmental impacts in the form of sedimentation, salinization, pollution, disease outbreaks, and loss of biodiversity (Kabir et al., 2015). This was mainly because of poorly planned and unscientific practices .Shrimp farming involved the introduction of exotic species and pathogens, and the ponds (gher) regularly discharged polluted water and sludge containing particulate matter, unused fish feed, fertilizer and other chemicals, microorganisms, and faeces (Kabir et al., 2015; Lin et al., 2011). Consequently, the land and water resources of the coastal ecosystem were being degraded, resulting in decreased production of rice, vegetables and other crops (Rahman, 2011), livestock, and freshwater species, exacerbating food insecurity and livelihood vulnerability (Kabir et al., 2015).

Cultivation of crops is almost absent in the South-western coastal region of Bangladesh, where Shrimp farming has been dominant since the mid-eighties (Hossain et al., 2013). Salinity intrusion into agricultural land is increasing because of sea level rise due to climate change. Thus the practice of agriculture is being tremendously hindered in the coastal areas except for shrimp farming. The introduction of high value cropping on the Dyke of ghers will be an important intervention, although it was practiced a while back. Furthermore, the increasing homestead area and Dyke area can be brought under vegetable cultivation. Gher based integrated farming with low investment is economically sound, ecologically feasible and socially acceptable. Compared with the simple technology of extensive farming and expansive higher technology of intensive farming, integrated farming is a viable and intermediate option for rural entrepreneurs giving relatively high yield with fairly low input cost. Dyke Vegetable Production (DVP) is an indigenous knowledge based practice which is environment friendly. The farmers in the area are following this practice as an alternative for their food security.

The production system adopted during Green Revolution has been explorative and the natural resources like soil and water were subjected to exploitation, as a result sustainability of agricultural production system has been jeopa rdized (Faroque et al., 2011). This suggests the integration of land-based enterprises viz. dairy, fishery, poultry, duckery, apiary, field and horticultural crops within the farm, with the objective of generating adequate income and the employment of the small and marginal farmers and thereby improves their livelihoods. Integrated farming is a multi-commodity farming system which can be defined as an innovation in which two or more commodities are farmed together on a common infrastructural base with the objective to optimize the operational cost (Faroque et al., 2011). Due to shrimp cultivation and water logged condition in the southwest region of Bangladesh; the scope of vegetables production is decreasing day by day in field condition. Dyke area creates an avenue for increasing vegetable production in the water logged areas of southwestern region of Bangladesh. In fact, in Dyke vegetable cultivation, the farmers face various production related problems. From this point of view, the researchers were very interested to undertake the research program entitled "Present Status and Problem Confrontation of Dyke Vegetable Production at Freshwater Ghers of Bagerhat district in Bangladesh". In order to proper direction to the research, the following specific objectives were formulated:

I. To determine the present status of Dyke vegetable production in the study areas,
II. To assess the impacts of Dyke vegetable production on food security,
III. To identify the problems of Dyke vegetable production confronted by the farmers,
IV. To explore the relationship between the selected characteristics of the respondents and problems confronted in Dyke vegetable production.

## METHODOLOGY

The study was conducted at three unions (Atjuri, Kodaliaand Kulia) of Mollarhatupazila under Bagerhat district of Bangladesh. The study area is known place for the researchers where around 168 gher owners, as per information received from the Upazila Agriculture office, were involved with Dyke vegetable production who had been considered as the population of research. Among them 50% (i.e., 84 farmers) were randomly selected as the sample of the study. Data were collected from randomly selected 84 (out of 168) Dyke vegetable producing farmers of the study area during 2nd February to 28th April, 2018. Data were collected using a pretested interview schedule through face-to-face interview. Data were collected on socio-economic characteristics of the respondents which were treated as independent variable viz. age, educational qualification, experience in farming, experience in fish farming, and experience in Dyke vegetable production, family size, farm size, annual income, organizational participation, cosmopoliteness, and extension media contact. Problem confrontation regarding problem confrontation in Dyke vegetable production was considered as dependent variable in this study. Collected data were analyzed by using SPSS software for different statistical techniques and for obtaining results and subsequent interpretation for satisfying the mentioned purpose of the study.

Data were collected on Dyke area, annual yield and income of Dyke vegetable production, present and previous amount of land used in Dyke vegetable production to study the present status of Dyke vegetable production on fresh water ghers. Data were also collected to determine the impact of Dyke vegetable production on food security. To measure Dyke area (decimal), annual Dyke vegetables yield (kg) and annual incomes ('000 Tk.) from Dyke vegetable production were considered. For categorizing the findings, mean ($\bar{X}$) and standard deviation (SD) were calculated and categorized as follows :(i) low "$< (\bar{X} - Sd)$", (ii) medium "$(\bar{X} - Sd) \leftrightarrow (\bar{X} + Sd)$" and (iii) high/large "$>(\bar{X} + Sd)$".

A number of 29 usually faced problems were identified and listed in the interview schedule. The respondents were asked about the problem they faced during Dyke vegetable cultivation on Dyke with their severity. A four-point rating scale such as highly severe, severe, less severe and not at all was assigned against each of the problems to indicate the severity, and a score of 3,2,1 and 0 was assigned against each of the scales, respectively. The problem confrontation score of a respondent was determined by summing up all the scores obtained by the respondent against the all problems. The problem confrontation score of respondents could range from '0' to '87' where '0' indicated no problem confrontation while '87' indicated high problem confrontation.

To determine the severity of a problem, Problem Confrontation Index (PCI) was calculated by using the following formula:

$PCI = N_h \times 3 + Ns \times 2 + N_l \times 1 + N_n \times 0$

Where,

PCI = Problem Confrontation Index

$N_h$ = Number of respondents rated the problem as highly severe

Ns = Number of respondents rated the problem as severe

$N_l$ = Number of respondents rated the problem as less severe

$N_n$ = Number of respondents rated the problem as not at all a problem

The PCI score of the respondents could range from '0' to '252' where '0' indicate not at all a problem and '252' indicate the highly severe problem. Statistical treatments such as number, percent, rank order, range, mean and standard deviation were used to interpret data. To explore relationship between any two variables Pearson's product moment correlation coefficient 'r' was employed. Data were analyzed using the Microsoft Excel and Statistical Package for Social Science (SPSS).

# RESULTS AND DISCUSSION

## Personal socioeconomic characteristics

Half (50.0%) of the respondents were middle aged as compared to 21.4 percent young aged and 28.6 percent being old aged. It might be said that middle to old aged people are more engaged in Dyke vegetable cultivation for gaining quickly double profit from gher shrimp farming as well as Dyke vegetable production (Table 1). Highest proportion (44.0%) of the respondents had primary level of education followed by illiterate (31.0%). It is clear from the study that all the respondents who are involved in Dyke vegetable production were not highly educated where none of the respondents had above higher secondary level of education. It could be concluded that three fourth (75%) of the respondents are illiterate and had primary level of education who are encouraged in shrimp production to get high quantity of profit quickly instead of continuing their education (Table 1).

Majority of the respondents (83.3%) had medium to high experience in farming followed by low experience (16.7%). Majority of the respondents (63.1%) had medium experience in fish farming followed by low experience (33.3%), and only 3.6% respondents had high experience. Most (77.4%) of the respondents had low level of experience whereas only few respondents had (22.6%) medium level of experience in Dyke vegetable farming. From the findings it could be concluded that, though majority (63.1%) of the respondents had medium experience in fish farming, most (77.4%) of them had low experience in Dyke vegetable farming (Table 1). Fish farming is an already established enterprise in southwest coastal region rendering medium experience of the respondents. However, Dyke vegetable farming is a comparatively new approach for ensuring the utilization of the fallow Dykes rendering low experience of the respondents.

Majority (56.0%) of the respondents' family belonged to small sized family followed by medium sized family (36.9%) while only about 7.1% belonged to large sized family. Majority (77.4%) of the respondents had small farm size compared to medium (17.9%) and marginal (4.8%) farm size. None of the respondent belongs to landless and large farm categories. Majority (61.9%) of the respondents belonged to higher income group as compared to medium (36.9%) income group and low income (1.2%). Most (89.3 %) of the respondents had no organizational participation as compared to low participation (10.7%). Majority (58.3%)of the respondents was medium cosmopolite while 41.7% were high cosmopolite and there were no respondents of low cosmopolitanism. Majority of the respondents (54.8%) had medium scale extension media contact followed by low scale extension media contact (45.2%). None of the respondent belongs to high contact categories (Table 1). Extension media contact is to some extent insufficient which causes difficulty in overcoming the faced problems in Dyke vegetable production.

## Present status of Dyke vegetable production in freshwater ghers

The present status of Dyke vegetable production was studied on some parameters viz. Dyke area, yield and income from Dyke vegetable production, present and previous amount of land (ha) used in Dyke vegetable production and vegetables grown.

### *Dyke area*

About three-fourth (72.6%) of the respondents had medium sized Dyke area followed by large sized Dyke area (14.3%) and small sized Dyke area (13.1%).It was found that most (86.9%) of the respondents had medium to large sized of Dyke that's why respondents can brought their Dyke area under vegetables cultivation in order to get additional incomes from there instead of keeping fallow year after year.

### *Yield and income from Dyke vegetable production*

Majority (71.9%) of the respondents belonged to medium yield group as compared to lower (17.9%) and higher (10.9) yield group. It is calculated that in study area respondents produced on an average 218.47 kg vegetable annually from one decimal Dyke area that is completely extra production. Majority (67.9%) of the respondents belonged to medium income category followed by low income (16.7%) and high income (15.5%) categories. It is calculated that respondents earned 3383.807 Tk. Annually from one decimal Dyke area by producing vegetables on Dyke which is an additional income (Table 2).

**Table1.** Distribution of the respondents on the basis of selected socioeconomic characteristics

| Characteristics | Categories | Score | Respondent (N=84) | | Min. | Max. | Mean | SD (±) |
|---|---|---|---|---|---|---|---|---|
| | | | Number | Percent | | | | |
| Age (Year) | Young | ≤ 35 | 18 | 21.4 | 20 | 70 | 45.39 | 11.45 |
| | Middle | 36-50 | 42 | 50.0 | | | | |
| | Old | >50 | 24 | 28.6 | | | | |
| Educational qualification (Schooling year) | Illiterate | 0 | 26 | 31.0 | 0 | 12 | 1.96 | 0.79 |
| | Primary | 1-5 | 37 | 44.0 | | | | |
| | Secondary | 6-10 | 19 | 22.6 | | | | |
| | HSC | 11-12 | 2 | 2.4 | | | | |
| | >HSC | >12 | 0 | 0 | | | | |
| Farming experience (Year) | Low | ≤10 | 14 | 16.7 | 6 | 50 | 19.01 | 9.21 |
| | Medium | 11-20 | 49 | 58.3 | | | | |
| | High | >20 | 21 | 25.0 | | | | |
| Experience in fish farming (Year) | Low | ≤10 | 28 | 33.3 | 3 | 30 | 13.45 | 4.83 |
| | Medium | 11-20 | 53 | 63.1 | | | | |
| | High | >20 | 3 | 3.6 | | | | |
| Experience in Dyke vegetable farming (Year) | Low | ≤10 | 65 | 77.4 | 4 | 20 | 9.79 | 3.07 |
| | Medium | 11-20 | 19 | 22.0 | | | | |
| | High | >20 | 0 | 0 | | | | |
| Family size (Number) | Small | 1-4 | 47 | 56.0 | 2 | 9 | 1.51 | 0.63 |
| | Medium | 5-6 | 31 | 36.9 | | | | |
| | Large | >6 | 6 | 7.1 | | | | |
| Farm Size (ha) | Landless | <0.02 | 0 | 0 | 0.03 | 1.73 | 0.72 | 0.37 |
| | Marginal | 0.02-0.20 | 4 | 4.8 | | | | |
| | Small | 0.21-1.00 | 65 | 77.4 | | | | |
| | Medium | 1.01-3.00 | 15 | 17.9 | | | | |
| | Large | >3.00 | 0 | 0 | | | | |
| Annual income ('000'Tk.) | Low | ≤150 | 0 | 1.2 | 99.6 | 1839 | 348.56 | 199.40 |
| | Medium | 150-300 | 1 | 36.9 | | | | |
| | High | >300 | 83 | 61.9 | | | | |
| Organizational participation (Score) | No | 0 | 75 | 89.3 | 0 | 1 | 2.98 | 0.10 |
| | Low | 1-3 | 9 | 10.7 | | | | |
| | Medium | 4-5 | 0 | 0 | | | | |
| | High | >6 | 0 | 0 | | | | |
| Cosmopoliteness (Score) | Low | ≤4 | 0 | 0 | 5 | 11 | 8.09 | 1.38 |
| | Medium | 5-8 | 49 | 58.3 | | | | |
| | High | 9-12 | 35 | 41.7 | | | | |
| Extension media contact (Score) | Low | 1-12 | 38 | 45.2 | 6 | 19 | 12.69 | 2.85 |
| | Medium | 13-24 | 46 | 54.8 | | | | |
| | High | >24 | 0 | 0 | | | | |

Source: Field Survey, 2018

**Table 2.** Distribution of the respondents on the basis of the parameters related present status of Dyke vegetable production in fresh water ghers

| Characteristics | Categories | Score | Respondent (N=84) | | Min. | Max. | Mean | SD (±) |
|---|---|---|---|---|---|---|---|---|
| | | | Number | Percent | | | | |
| Dyke area (decimal) | Small<br>Medium<br>Large | $< (\bar{X} - Sd)$<br>$(\bar{X} - Sd) \leftrightarrow (\bar{X} + Sd)$<br>$> (\bar{X} + Sd)$ | 11<br>61<br>12 | 13.1<br>72.6<br>14.3 | 2.38 | 28.41 | 11.38 | 4.44 |
| Annual yields from Dyke (kg) | Low<br>Medium<br>High | $< (\bar{X} - Sd)$<br>$(\bar{X} - Sd) \leftrightarrow (\bar{X} + Sd)$<br>$> (\bar{X} + Sd)$ | 15<br>60<br>9 | 17.9<br>71.4<br>10.7 | 990 | 10700 | 6458.33 | 1814.36 |
| Annual income Dyke ('000'Tk.) | Low<br>Medium<br>High | ≤75<br>75-150<br>>150 | 14<br>57<br>13 | 16.7<br>67.9<br>15.5 | 17.08 | 178 | 116.46 | 35.08 |
| Present amount of land (ha) used in Dyke vegetable production | Small<br>Medium<br>Large | $< (\bar{X} - Sd)$<br>$(\bar{X} - Sd) \leftrightarrow (\bar{X} + Sd)$<br>$> (\bar{X} + Sd)$ | 12<br>61<br>11 | 14.3<br>72.6<br>13.1 | 0.01 | 0.22 | 0.05 | 0.02 |
| Previous amount of land (ha) used in Dyke vegetable production | Small<br>Medium<br>Large | $< (\bar{X} - Sd)$<br>$(\bar{X} - Sd) \leftrightarrow (\bar{X} + Sd)$<br>$> (\bar{X} + Sd)$ | 4<br>43<br>37 | 4.8<br>51.2<br>44.0 | 0.01 | 0.07 | 0.04 | 0.01 |

Source: Field Survey, 2018

***Present and previous amount of land (ha) used in dyke vegetable production***

It has been shown in Table 2 that, about three-fourth (72.6%) of the respondents had medium sized Dyke area followed by large sized (14.3%) and small sized Dyke area (13.1%) in present year (2018); whereas about half (51.2%) of the respondents had medium sized Dyke area followed by large sized (44.0%) and small sized (4.8%) Dyke area in previous year (2017). The amount of small and medium size Dyke area in ghers reduces compared to large Dyke area due to low production, which is not profitably sufficient to continue gher farming in small to medium scale. But the farmers who have large sized Dyke in ghers continued due to high quantity of cumulative profit. Usually the Dyke remains empty and not used for any production purpose. If the fallow Dykes are brought under vegetable cultivation by using improved methods, the shrimp farmers will definitely have an additional production and subsequent income from that grown vegetables which could contribute to the food security in terms of both production and purchasing capacity.

***Vegetables grown on dyke of freshwater gher***

Most (92.85%) of the respondents grown cucumber and bitter gourd in the Dyke followed by bottle gourd (47.61%) and tomato (36.90%). The reason behind this might be the high price of those vegetables (Table 3). About half (51.19%) of the respondents grown Lady's finger in the Dyke during lean period followed brinjal (48.81%) and tomato (47.61%).Usually during lean period, vegetables' scarcity is observed in the markets as well as farmers' field.

***Impact of dyke vegetable production on food security***

Vegetable production in lean period will ultimately help to ensure the food security. The freshwater prawn production was 82,661 tons in 2004-'05 fiscal year and the production was 336 kg $ha^{-1}$ i.e., the area covered by prawn cultivation was approximately 2,46,000 ha. If we consider the Dyke area @ 5% of the total area under production then approximately 12,300 ha land could be obtained for Dyke vegetable production. It is calculated that in study area respondents produced on an average 218.47 kg vegetable annually from one decimal Dyke area i.e., 53,962.09 kg $ha^{-1}$ which is completely extra production. If the fallow Dyke areas are brought under vegetable cultivation by using improved methods in that time the farmers will ensure the availability of vegetables in the markets and also ensures their family nutrition which could ultimately be treated as a contribution to overall food security (Table 4).

## Problem Confrontation

The problem confrontation scores of the respondents varied from 0-87 with a mean and standard deviation of 39.54 and 4.90 respectively. Based on possible problem confrontation scores, the respondents have been classified into three categories as shown in Table 5. Most (96.4 %) of the farmers had medium problem confrontation while 3.6% of the farmers had low problem confrontation. None of the farmers had high problem confrontation. There are lots of unsolved issues regarding Dyke vegetable production which are the outcomes of the prevalence of existing problems. Proper extension measures should be undertaken to help the farmers to overcome those problems so that Dyke vegetable production gets more popularity and higher production could be obtained in terms of both quality and quantity.

***Rank order of problems as confronted by dyke vegetable producers***

The farmers of the study area confronted 29 problems to different extent. Data presented in Table 6 indicate that "lack of technical knowledge for identification of diseases" was the highly severe problem while "unavailability of fertilizer in season" was the least severe problem. The severe problems should be taken under consideration on priority basis for immediate solution. Many of the Dyke owners are not familiar with diseases of vegetables which they want to produce on their gher Dykes. Thus, they fail to cure the diseases, and even they might not have sufficient knowledge of disease prevention measures. Besides, now-a-day, the availability of different types of fertilizers in the market is satisfactory. Thus, it becomes the least severe problem, or we might say no problem.

**Table 3.** Distribution of the respondents based on the types of vegetables grown in Dyke of the study area

| Vegetables name | Respondent (N=84) | | Rank |
|---|---|---|---|
| | Citation | Percentage | Order |
| Tomato | 31 | 36.90 | 3rd |
| Cucumber | 78 | 92.85 | 1st= |
| Bottle gourd | 40 | 47.61 | 2nd |
| Sweet gourd | 28 | 33.33 | 4th |
| Bitter gourd | 78 | 92.85 | 1st= |
| Brinjal | 4 | 4.76 | 5th |
| Cabbage | 2 | 2.38 | 7th |
| Papaya | 1 | 1.19 | 8th |
| Ribbed gourd | 3 | 3.57 | 6th |

Source: Field Survey, 2018

**Table 4.** Distribution of the respondents based on the types of vegetables grown in Dyke of the study area during lean period

| Vegetables name | Respondent (N=84) | | Rank |
|---|---|---|---|
| | Citation | Percentage | Order |
| Tomato | 40 | 47.61 | 3rd |
| Brinjal | 41 | 48.81 | 2nd |
| Pea | 18 | 21.42 | 5th |
| Sweet gourd | 25 | 29.76 | 4th |
| Papaya | 10 | 11.91 | 6th |
| Lady s finger | 43 | 51.19 | 1st |
| Cucumber | 2 | 2.38 | 7th |
| Bitter gourd | 1 | 1.19 | 8th= |
| Ribbed gourd | 1 | 1.19 | 8th= |

Source: Field Survey, 2018

**Table 5.** Distribution of the respondents according to their problem confrontation

| Categories | Score | Respondent (N=84) | | Mean | Standard Deviation | Min. | Max. |
|---|---|---|---|---|---|---|---|
| | | Number | Percentage | | | | |
| Low | 1-30 | 3 | 3.6 | | | | |
| Medium | 31-60 | 81 | 96.4 | 39.54 | 4.90 | 29 | 50 |
| High | 61-90 | 0 | 0 | | | | |
| Total | | 84 | 100 | | | | |

Source: Field Survey, 2018

**Table 6.** Rank order of problems based on problem confrontation index

| Types of problem | Severity of the problems (N=84) | | | | PCI | | | Rank order |
|---|---|---|---|---|---|---|---|---|
| | HS (3) | MS (2) | LS (1) | NAA (0) | Total | Score | % | |
| Unavailability of seed and/ seedlings | 3 | 20 | 47 | 14 | 84 | 96 | 38.09 | 17th |
| High price of seed / seedlings | 1 | 28 | 75 | 5 | 84 | 109 | 43.25 | 14th |
| Problem of seed germination | 1 | 13 | 50 | 20 | 84 | 79 | 31.34 | 24th |
| Purity of seed | 4 | 27 | 44 | 9 | 84 | 110 | 43.65 | 13th |
| Lack of knowledge for selecting appropriate vegetables | 5 | 33 | 38 | 8 | 84 | 119 | 47.22 | 10th |
| Unavailability of fertilizer in season | 1 | 16 | 33 | 34 | 84 | 68 | 26.98 | 25th |
| High demand and high price of Fertilizer | 1 | 18 | 47 | 18 | 84 | 86 | 34.12 | 22th |
| Lack of good quality fertilizer | 2 | 22 | 32 | 28 | 84 | 82 | 32.53 | 23th |
| Lack of knowledge of balanced fertilizer | 16 | 24 | 31 | 13 | 84 | 127 | 50.39 | 8th= |
| Fertilizer enhance insect attack | 33 | 17 | 25 | 9 | 84 | 158 | 62.69 | 4th |
| Lack of technical knowledge of Fertilizer application | 16 | 26 | 27 | 15 | 84 | 127 | 50.39 | 8th= |
| Deficiency of irrigation water in season | 1 | 18 | 50 | 15 | 84 | 89 | 35.31 | 20th |
| Contamination of salinity in irrigation water | 2 | 17 | 48 | 17 | 84 | 88 | 34.92 | 21th= |
| High percentage of insect attack | 35 | 16 | 22 | 11 | 84 | 159 | 63.09 | 3rd |
| High percentage of diseases | 8 | 25 | 39 | 12 | 84 | 113 | 44.84 | 12th |
| High price of insecticide or pesticide | 16 | 22 | 34 | 12 | 84 | 126 | 50.00 | 9th |
| Lack of technical knowledge for identification of Insects | 31 | 31 | 16 | 6 | 84 | 171 | 67.85 | 2nd |
| Lack of technical knowledge for identification of diseases | 47 | 16 | 18 | 3 | 84 | 191 | 75.79 | 1st |
| Poor productivity | 5 | 31 | 32 | 16 | 84 | 109 | 43.25 | 14th |
| Low market price in respect of production cost | 13 | 26 | 37 | 8 | 84 | 128 | 50.79 | 7th |
| Lack of marketing facilities | 9 | 15 | 43 | 17 | 84 | 100 | 39.68 | 16th |
| Lack of preservation facilities | 22 | 14 | 22 | 26 | 84 | 116 | 46.03 | 11th |
| Lack of loan facilities | 3 | 14 | 51 | 16 | 84 | 88 | 34.92 | 21th= |
| Lack of information | 18 | 25 | 25 | 16 | 84 | 129 | 51.19 | 6th |
| Salinity reduce the productivity | 5 | 17 | 43 | 19 | 84 | 92 | 36.50 | 19th= |
| Rats attack | 35 | 13 | 10 | 26 | 84 | 141 | 55.95 | 5th |
| Security of products | 13 | 17 | 35 | 19 | 84 | 108 | 42.85 | 15th |
| Shortage of labor | 3 | 20 | 46 | 15 | 84 | 95 | 37.69 | 18th |
| High wage of labor | 3 | 19 | 45 | 17 | 84 | 92 | 36.50 | 19th= |

HS = Highly severe, S = Severe, LS = Less severe, NAA = Not at all, PCI = Problem confrontation index
Source: Field Survey, 2018

**Table 7.** Relationship between the selected characteristics of farmers and their problem confrontation

| SL No. | Characteristics (Independent variable) | Dependent variable | Correlation coefficient |
|---|---|---|---|
| 1 | Age | Problem Confrontation of Dyke vegetable production | -0.150$^{NS}$ |
| 2 | Level of Education | | 0.123$^{NS}$ |
| 3 | Experience in farming | | -0.117$^{NS}$ |
| 4 | Experience in fishing | | -0.082$^{NS}$ |
| 5 | Experience in Dyke vegetable cultivation | | -0.083$^{NS}$ |
| 6 | Family Size | | -0.090$^{NS}$ |
| 7 | Farm Size | | -0.002$^{NS}$ |
| 8 | Annual family income | | 0.279$^{*}$ |
| 9 | Organizational participation | | 0.165$^{NS}$ |
| 10 | Cosmopoliteness | | -0.041$^{NS}$ |
| 11 | Extension contact | | -0.286$^{**}$ |

*Significant at 5% level, **Significant at 1% level, NS- Non-significant

Source: Field Survey, 2018

**Relationship between the selected characteristics and problem confrontation**

The findings related to relationship of selected characteristics of the respondents and their problem confrontation appears in Table 7. Data presented in Table 7 show that among 11 selected characteristics of farmers, extension media contact showed a negative significant relationship with the problem confrontation. It means that the higher is the extension contact; the lower is the problem confrontation of the respondents in Dyke vegetable cultivation. On the other hand, the annual family income showed a positive significant relationship with the problem confrontation. It means that the higher is the annual family income, the higher is the ability of the gher owners to confront the problems in Dyke vegetable production.

## CONCLUSION

Majority of the respondents were middle to old aged farmers, had primary level of educational qualification followed by illiterate, having medium to high experience in farming and medium to low experience white-fish farming but low experience in Dyke vegetable production, and also having small sized family, small sized farms, high annual income, low organizational participation, medium cosmopolitanism and medium extension media contact. Ghers got tremendous expansion in the southwest coastal region caused serious soil degradation and reduced productivity of crops. But it is now a felt need to increase the crop production. As a result initially the farmers took steps to produce vegetables on the Dykes of the ghers very recently. The types of vegetable grown, cropping intensity, yield and income from vegetable production on the Dyke, its impact on food security indicate that the present status is progressing towards improved situation and is of huge prospect though some problems were observed. The respondents of the study area confronted 29 problems related to Dyke vegetable production with different extent of severity. The most severe problem in Dyke vegetable farming in the study area was lack of technical knowledge for identification of diseases was the highly severe problem while unavailability of fertilizer in season was the least severe problem. Among 11 selected characteristics of the respondent's only annual family income showed a significant positive relationship and extension contact showed a negative significant relationship with the problem confrontation.
The freshwater gher farmers are becoming interested day by day to cultivate crops on the Dykes. However, they confront medium problems while performing Dyke vegetable production. Appropriate measures should be undertaken to reduce these problems as minimum as possible. The types of vegetables grown, cropping intensity, yield and income from vegetable production on the Dyke, its impact on food security indicate that the present status is progressing toward huge prospect though some problems are observed.

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