A STUDY ON THE AVAILABILITY OF MEDICINAL PLANTS FOUND IN THE HOMESTEADS OF KALIAKOIR UPAZILA OF GAZIPUR DISTRICT

SADIA AFRIN

DEPARTMENT OF AGROFORESTRY AND ENVIRONMENTALSCIENCE
SHER-E-BANGLA AGRICULTURAL UNIVERSITY
DHAKA-1207

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SADIA AFRIN

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Approved By:

Md. Shariful Islam **Assistant Professor** **Supervisor**	**Dr. Ferzana Islam** **Professor** **Co-Supervisor**

Prof. Dr. NazmunNaher
Chairman
Examination Committee

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Date: June, 2018
SAU, Dhaka, Bangladesh The Author

DEDICATED TO ALL MY WELL WISHERS

Department of Agroforestry and Environmental Science
Sher-e-Bangla Agricultural University
Sher-e-Bangla Nagar, Dhaka-1207

CERTIFICATE

This is to certify that the thesis entitled, "A STUDY ON THE AVAILABILITY OF MEDICINAL PLANTS FOUND IN THE HOMESTEADS OF KALIAKOIR UPAZILA OF GAZIPUR DISTRICT" *submitted to the Faculty of Agriculture, Sher-e-Bangla Agricultural University, Dhaka, in partial fulfillment of the requirements for the degree of* ***MASTER OF SCIENCE (MS) IN AGROFORESTRY AND ENVIRONMENTAL SCIENCE,*** *embodies the results of a piece of bona fide research work carried out by SADIA AFRIN, Registration No.* ***12-05167*** *under my supervision and guidance. No part of this thesis has been submitted for any other degree or diploma.*

I further certify that such help or source of information as has been availed of during the course of this investigation has duly been acknowledged.

Dated: June, 2018
Dhaka, Bangladesh

Md. Shariful Islam
Assistant Professor
Supervisor

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ABSTRACT

Medicinal plants are known as the beneficial plants form the prehistoric times. Therefore, an investigation was done to know the density, factors of medicinal species plantation by the farmers in the homesteads in Kaliakoir upazila of Gazipur. Information was gathered through a set of questionnaire. 82 no. respondents were randomly selected in four villages of 2 unions. Eleven chose attributes of the homesteaders was taken as autonomous factors. The attributes were age, education, family size, homestead area, plantation area, annual income from medicinal plants, organizational participation, training exposure, environmental awareness, knowledge about medicinal plants and number of medicinal plants. The discoveries in regard of assessment with Bel (2.41%), Desi Neem (1.35%), Sajna (1.25%), Akon (0.73%) and Tulsi (0.72%) was found dominant medicinal species. Young aged (43.9%) people found in number, among the respondents. Most of them completed primary level (53.7%), medium size families (50%), medium (63.4%) homestead area, small (76.8%) plantation area, medium income (81.7%), low organizational participation (58.5%), most of them with low training exposure (50%), medium environmental awareness (39.1%), medium Knowledge (54.9%), medium medicinal plants (62.2%) was observed. There was significant connection between density of medicinal plant with age, education, annual income and Organizational participation, training exposure and number of medicinal plants. Therefore it was found that variables were highly interlinked with density of medicinal plants in homesteads. Further study should be carried out to investigate so that clear and deeper information may found.

LIST OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

BAU	**:**	**Bangladesh Agricultural University**
BBS	**:**	Bangladesh Bureau of Statistics
DoF	**:**	Department of forestry
et al.	**:**	and others
FAO	**:**	Food and Agriculture Organization
AEO	:	Agriculture Extension Officer
UAO	**:**	Upazila Agriculture Officer
Wikipedia	**:**	A site of information

CHAPTER I

INTRODUCTION

Bangladesh is a tiny country covering about 1,47,570 sq. kilometer of land area that have a huge population of 182.7 million and where have a only 2,10,000 core acre of cultivatable land that supports about more than 60% of the people. Those of them are 35% actual poor and 40% is poor. Annual income is rising by 1909 USD but per capita homestead area is only about less than 02 decimal while we have 35 districts that lacks the natural forest. There the tree species are random. The area of homesteads is decreasing at a constant rate from the beginning of the nineteen century. Trees and plantation in the homesteads area are decreasing annually are in 2011, 2012,2013,2014,2015 were 3.0, 2.7, 2.7, 2.65 and 2.5 respectively. In health cases people of 60% those who have lived in the rural areas are devoid of health facilities. Doctors are not also available therefore. In this context they are highly dependent upon the locale measures for the remedial of the diseases. They plant the medicinal plants in the homesteads from the ancient times. In the middle of the century people starts the use of planting the medicinal plants in the homesteads commercially also (Nurul, 2013).Moreover it is not in the use that about 40% of the rural people grow medicinal plants for their personal use rather than the use in commercial purpose. People produce the plants especially in the purpose of producing the timbers, wood, medicines and others for themselves. Annual forest production is very low in our country that is only near around $3m^3$/ha in every year (Zebsyn, 2019). UNDP, WB estimates that the medicinal plants and fruit trees are most common produce that re grown in our homesteads preferably. The tree that is produces in the orchards and in the homesteads they produce the fruit along some medicinal plants. But medicinal plants helps in producing annual income generation in an average of 5-10 thousands/year in Rajshahi (Rahman *et al*, 2008). That helps to survive from different disaster and diseases. Meanwhile there is also a part that medicinal plant in the homesteads that

it freshens air and removes pathogen from the air. In the present context it is seen that all over the word, people are using and interested in the medicinal plant usage compared to the complexity of pharmaceuticals entries (Nurul, 2013). China and India are the two largest producers of the medicinal plants in the world respectively that is about 5000 and 7000 species while there is the proof of the medicinal plant usage in eczema diseases in Malaysia, Thailand, Singapore and Vietnam (Khalid, 1997).

As Bangladesh is the country of sub-tropical zone that have more than 1000 species which have regarded as the medicinal plant in the different part of the country (Ahiul *et al*, 2013). In the hilly area of Bangladesh especially in the hill tract zone Chattagram, Rangamati and Khagrachori are more often known for their medicinal plant use for their diseases treatment. Meanwhile it is reported that more than 70% of the people are termed to natural medicinal plant for their remedial. Again the others are not allowed to cut the medicinal plants from their homesteads. It indicates that from the social and economical and the effectiveness corner of medicinal plants it is one of the most important factors to rethink those medicinal plants must be cultivated in the homesteads of the locality. From the government point of view it is a known problem that we import too many semi processed and processed drugs' raw material from the outside of the country and exposed about 2.5 billion of the BDT per year. The forests cannot meet the demand of woods of the country and observed that 90% of the fuel wood and bamboo, and 70% of timber requirement of the country were met from the 690 km^2 of homestead Agro forestry.

The yield of this plantation is 7-9m^3/ha/yr. Homestead Agro forestry is the integration of tree, crop and vegetable on the same area of land is a promising production system for maximizing yield. Homestead represents a land use system involving purposeful management of multipurpose trees and shrubs intimate association with seasonal vegetables. Therefore proper documentation and data

collection of available medicinal plant species is a crying need of time. The high availability of the medicinal plant species in the homesteads has a wide socioeconomic value alongside agro ecological role including fodders, feed medicine and climatic facilities. Medicinal plants in the homesteads increase the income of the farmers and serves as the safety net during the time of the hazards. They have too many beneficial impacts on social and environmental space. As Kaliakoir a well-known city near the capital Dhaka as it is one of the most polluted cities of the world while Gazipur the nearest industry based city district. Kaliakoir a known city for high richness of the tree species and therefore there must have a wide number of research but unfortunately there is a few research regarding medicinal plant all over the Bangladesh. There it is necessary to identify the available density of medicinal plant species that is present in the homesteads of kaliakoir upazila of Gazipur District. Proper documentation may help the government and research analyst to define the available species of that locality of a certain area that what types of species are growing within these area and what is the density of the certain species growing near side the capital it can be vital for the medicinal raw material production. But the medicinal plant that is in cultivation not fully identified the use or intervened and characterized must be a consideration. So the present study is a require for the documentation and dissemination of knowledge through a fulfillment of these following objective-

1. To find out the density of medicinal plant in the homesteads of the farmers.
2. To determine and describe some selected characteristics of the medicinal plant growers.
3. To explore the relationship of the selected characteristics of the farmers to their medicinal plant abundance.

CHAPTER 2

REVIEW OF LITERATURE

A. Medicinal Plants and its distribution

M.F Kabir *et al*. (2018) stated that leaves of the medicinal plants were found leading in terms of their use followed by whole plant, stem, bark, latex, fruits, rhizome, bulb, tuber, seed, root and inflorescence.

A.K.M Monzur *et al.* (2017) found that the Botanical garden has harbored a large collection of ethno-medicinal plants; more than 350 species have been conserved, and the number is ever increasing. Among these, 23 species are threatened in Bangladesh territory; however, many of them are rare in the wild.

AHM Mahabub rahman (2013) observed in his study that a total of 24 species belonging to 13 genera of the family *Cucurbitaceae* were collected and recorded for their use in various ailments. Among the medicinal species, *Diplocyclos palmatus (L.) Jeffrey, Gymnopetalum cochinchinense (Lour.) Kurj., Melothria maderaspatana (L.) Cogn., Thladiantha cordifolia (BL.)* Cognition have been reported as new medicinal species from Bangladesh.

Mahabubur rahman (2018) found that traditionally used medicinal plants have been a source of relief in controlling different types of diseases throughout the globe. People living in rural areas of developing countries including Bangladesh relies mainly indigenous medicinal practice to get rid of various diseases. A total of 33 medicinal plants belonging to 28 families and 33 genera were recorded.

Momionul *et al*. (2018) reported that it can be concluded that among the tested plant species, *C. aurantifolia, M. oleifera, A. muricata, A. marmelos, C. tamala, and A. indica* are strongly allelopathic and therefore, could be used as potential candidates for the development of eco-friendly natural medicinal plants.

AKM. Moonzur *et al*. (2011) reportedly identifies key problems and challenges and indicates ways of maximizing the potentials of the medicinal plants sector and constraining factors.

M. A Hoque *et al*. (2018) found that Farmer's opinion regarding multipurpose tree species in the homesteads and identified 28 medicinal species in the homesteads of tangail district.

Nizam Uddin *et al*. (2013) stated that *Syzygim cumini* is the most powerful scavenger among all tested medicinal plants and also most strong scavenger than ascorbic acid and BHT. Scavenging activity was found to increase in dose dependent manner. Another 30 medicinal plants exhibited good scavenging property and 14 medicinal plants showed moderate scavenging activity.

Mizanur *et al*. (2013) stated that 119 plant species belonging to 64 families were used by the traditional medical practitioners for treatment of various ailments. The most frequently used families were Asteracea with six species followed by Moraceae, Solanaceae and Apocynaceae with five species. Among the selected species the maximum contribution was recorded for herbs with 38% species followed by trees (32%), shrubs (21%), climbers (7%) and palm (2%). Assessments of reported ethno-medicinal activity indicate that these plant species can potentially be of pharmacological interest as well as for conservation of biodiversity.

M.A Rahman (2007) stated that large proportion of the total consumption of medicinal plants is harvested from the wild while cultivation provides only a very small per cent of medicinal plants. This is evident from the fact that of the total consumption of medicinal plants in China 80%, in India 90%, in South Africa 99% are met from collection from the forest and other natural habitats. There are many parts of the world in which there is virtually no cultivation on any significant scale, including, by way of examples, Albania and Turkey in Europe,

Pakistan and Bangladesh in Asia, and all countries in Africa. In Bangladesh where herbal medicines have been used for centuries, the most important markets are the rural consumers.

B. Homesteads and Medicinal plants

Shafiul and Masum (2005) found that most of the farmer (76%) preferred to plant fruit tree species for future plantation followed by timber species (62%). Diversity and abundance of fruit species was found higher in all homestead. Poultry (64%) was the major livestock component of each household followed by Goat (12%), Cattle (10%), Buffalo (8%), and sheep (6%).

Mahfuzur *et al*. (2009) reported that Livelihood of rural inhabitants in this region is closely related with homestead plant diversity where the people are dependent on plant resources for their food, medicine, timber and house making materials, fodder and other minor products. Some of the homestead species serves as life support species. Homestead plant diversity also playing potential role on the socio-economic development of rural people in coastal region. It is evident through the present research project that in one side homestead plant diversity can ensure food security mainly for landless people, on the other hand homestead products provide alternative or (and) additional income generation which enable rural people for a better livelihood.

Ferdaousy *et al*. (2018) stated that 75% of the respondent had medium participation in homestead medicinal plants production as compared to 21% low participation and 4% high participation

Mahadi Hasan (2014) stated that in Chattogram total number of herb species were 53, whereas shrubs, climbers and trees were 28, 3 and 16, respectively. The family Asteraceae contained the highest number of species (8), followed by Apocynaceae

(7), Caesalpiniaceae (6), Fabaceae (5), Liliaceae (5), Euphorbiaceae (3), Araceae (3), Solanaceae (3), Poaceae (3) and others. The highest percentage of usable plant parts were the leaf (41%), whereas other usable plant parts were root (22%), bark (12%), fruit (12%), flower (4%), rhizome (2%), stem (2%), seed (2%), tuber (1%), inflorescence (1%), trunk (0.5%) and whole plant (0.5%).Database are emphasized on the importance of setting up conservation priorities, sustainable development and therapeutic uses of various medicinal plants.

C. Use of Medicinal plants

Jasim uddin *et al*. (2017) observed that leaf is the dominant part used followed by fruit, root and rhizome, whole plant, seed, stem, bark, petiole, bulb, peduncle, latex and flower. In the documented 124 species, herbs were represented by 43%, trees by 31%, shrubs by 15% and climbers by 11% species. Oral consumption is the main mode of treatment in the study area and followed by external application. Maximum formularies were found in the six ailment groups including gastrointestinal complain, diarrhea and dysentery, fever and cough, dermatitis, jaundice and impotence.

Mahabub and Sarker (2015) stated that one hundred and forty three (143) medicinal plants have been documented with their uses for the cure of more than 109 diseases, and some of these are abscess, asthma, abortion, cough, cold, chicken pox, constipation, dysentery, diarrhea, diabetes, eczema, fever, and fracture of bone, headache, heart disease, itches, jaundice, menstrual disease, paralysis, piles, skin diseases, snake-bite, sex problems, toothache, vomiting, worm, wound and others. In majority cases, leaves of the medicinal plants were found leading in terms of their use followed by whole plant, stem, bark, fruits, rhizome, seed, root and flower. For each species scientific name, family, medicinal use and part(s) used are provided.

Shahadat *et al*. (2010) reported that rural patients are more dependent on traditional or folk medicinal healers for treatment of urinary tract infections (UTIs) and sexually transmitted diseases (STDs) for a number of reasons including lack of access to modern medical facilities, clinging to traditional approaches, and finally hesitancy to relate this form of illnesses in front of unknown doctors.

Amina Khatun (2014) found that fourteen extracts of different parts of eleven Bangladeshi medicinal plants which have been traditionally used for the treatment of different types of carcinoma, tumor, leprosy, and diseases associated with cancer were evaluated for their cytotoxicity for the first time.

Kabidul Azam (2015) reported that Plant derived natural compounds (vincristine, vinblastine, etoposide, paclitaxel, camptothecin, topotecan, and irinotecan) are useful for the treatment of cancer.

Anup Kumar *et al*. (2015) reported that leaves were the most cited plant part used against these diseases. Most of the plant species were very common and were cultivated or planted in homestead or roadsides. From the study, we found medicinal plant family Apiaceae 15.79%; Meliaceae, Zingiberaceae and Poaceae 18.18% each; Myrtaceae and Fabaceae 20% each are widely used for GIT disorder, skin diseases and sexual dysfunction respectively.

Rahman *et al*. (2008) found that Most of the respondents were middle-aged having small farm size (60%) of homestead in use of medicinal plants production.

Bishwajit (2013) resulted that the majority of the species were used as fruit and food (45%) followed by medicinal plants (38.71%), firewood (32.26%), and timber (29%). Ecological diversity indices indicated that the existing plant species in the homestead gardens in the study area have moderately high biodiversity and species richness. Farmers perceived importance for homestead plant species

conservation was for fruit and food(85%) followed by building materials (78.75%), subsistence family income (73.75%), and source of firewood (68.75%).

Sadana and Dipok (2016) reported that climate change effects on medicinal plants are widely unclear in Bangladesh. At present, a huge number of populations in Bangladesh are directly dependent on the healthcare treatment by medicinal plants that is why it is an emerging Concern in Bangladesh.

Snighda *et al*. (2018) stated that Plants and herbs have been the mainstay of treatment in many rural and tribal areas of Bangladesh for the immense availability of medicinal plants in this region. Nature and natural remedies are widely accepted by people around the world from ancient times. Barks, root, stem, flower, seed various parts of plants were used against ailments or infections caused by microbes even before the discovery of various microorganisms.

Fakir (2015) stated that Majority of the tribal communities of the country live in this area and depend on the plant re-sources for their food, fuel, fruit, vegetables and medicine. The use of wild plants forms part of their traditional or indigenous systems of knowledge and practice that have accumulated and developed over generations. The widely used medicinal plant species are – *Neemada (Buddleja asiatica), Mondessa (Campanumoea celebica), Kanphutki (Cardiospermum halicacabum), Pahari bichuti (Cnesmone javanica), Pidaghi (Cratoxylum sum-stranum), Madanmasta (Dehaasia kurzii), Chotra-pata (Laportea crenulata), Mughal mani gach (Nelsonia campestris), Kulla (Desmos longiflorus)* etc.

D. Others Perspective of medicinal plants

Sharmin and Rabbi (2016) reported that the middle aged farmers (42.7%) were mostly interested in adopting agro forestry with traditional medicinal plant production. Above 80% respondents have taken positively medicinal plants based

agro forestry practice, but did not receive formal training skills or facility but just inherited ideas from their superiors. Most of the farmer's (94.12%) have positive attitude towards medicinal plants based Agro forestry in Jhenaidah district.

M.A Haque *et al*. (2008) defines that the Kavirazes of the 11 villages surveyed used a total of 55 medicinal plants distributed into 35 families in their formulations.

Khalid (2013) reported that 100 (i.e. 40% of the total population) rural women were as the sample for his study. The findings revealed that the highest proportion (71%) of rural women had high, 21% medium and 8% had low integrated homestead medicinal plants in farming technologies.

Mafroja *et al*. (2018) found that Local people of the area depend on knowledge of "Kabiraj" (locally healer's common name) for simple ailments and also people depend on local primary healthcare centre for major health problems.

Obaidullah (2018) stated that In Bangladesh The total size of medicinal plant market at wholesale prices was estimated at some US$14 million – corresponding to 17000tones of product. Local supply accounts for about 70% by volume and 40% by value.

Nawshin *et al*. (2016) reported that the highest proportion (52.5%) of the respondent had medium participation in homestead medicinal plants cultivation while 36.7 percent had low participation and 10.8 percent had high participation.

Nurul (2013) reported that independent decision making authority and increased involvement in family affairs are positively associated with empowerment. Medicinal plant is playing a great role in these cases.

Masud Prodhan (2011) reported that the homestead garden provides multiple products to the household and meets the diversified needs including food, nutrition, medicine and energy

CHAPTER 3

MATEIALS AND METHODS

The methods and procedures followed in this study are presented below-

3.1 Study Area

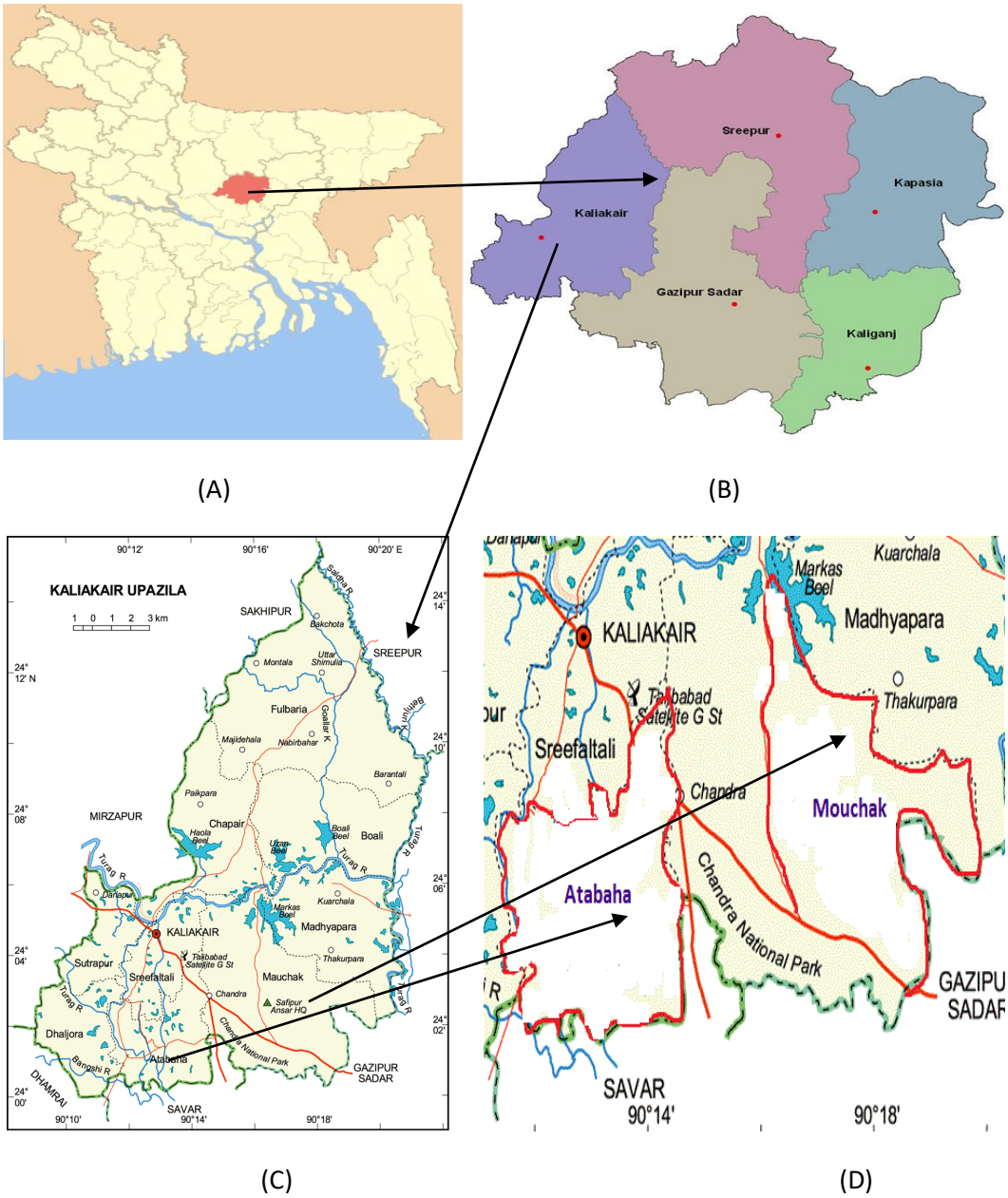


Fig 1: Maps showing the study area (A. Map of Bangladesh, B. Map of Gazipur District, C. Map of Kaliakoir upazila, D. Map of selected unions of Kaliakoir Upazila. (Source: www.lged.gov.bd).

The study was conducted in Kaliakair upazila of Gazipur District. Kaliakair is located at 24.0750°N 90.2167°E. It has 45565 households and total area 314.14 km². It is bounded by mirzapur and sakhipur upazilas on the north, savar and dhamrai upazilas on the south, gazipur sadar and sreepur upazilas on the east, Mirzapur upazila on the west. Population Total 267003; male 138240, female 128763; Muslim 231672, Hindu 34306, Buddhist 910, Christian 30 and others 85.Water bodies Main Rivers: turag, bangshi, Salda; Boali, Hawla, Ujan and Markaj beels and Goala and Betjuri canals are notable. Administration Kaliakair Thana was formed in 1923 and it was turned into an upazila' on 2 July 1983.' Kaliakair has 9 Unions/Wards, 181 mauzas/mahallas, and 283 villages. Also has Municipality with 9 wards.

3.2 Soil condition in general

The imperative physiographic highlight of the locale is the Briand tract. It is essentially leveled with gradually porous soils. The dirt or the Briand contains an overabundance of iron and lime. In any case, this dirt is lacking in silicon matter as it jumps on stores of sand from floodwater. Northern piece of the locale contains Gray dark colored mud topsoil of the dismembered patio of Briand tracts. The eastern part is secured by pale dark colored silty topsoil of mender floodplain of the more seasoned Ganges and the southern part, by darker silty soil alluviums of the dynamic and very Ganges wanders floodplain

3.3 Climate

Precipitation

The atmosphere is commanded by the storm which for the most part starts in May and finishes in September. The precipitation as recorded in 2017 was 1862 mm.

around there the late spring starts from the center April and proceeds till the center of July. The blustery season starts from the finish of June and proceeds till the late September.

Temperature and stickiness

Following hot and stormy season, the winter or cold season starts from the mid November and endures until February. Least and most extreme mean yearly temperature regularly shifts between 10.60C to 36.40C. The mean month to month relative moistness ranges from 64% in the dry season to about 88% in the stormy season.

3.4 Data Collection procedures and processing

Data collecting instrument

So as to gather significant data from the respondents, a questionnaire was utilized. The questionnaire was deliberately structured keeping the goals of the investigation in view. The questionnaire contains both open and closed from inquiries. Simple, basic and direct inquiries and distinctive scales were utilized to get data. The inquiries were orchestrated efficiently and exhibited unmistakably to get those comprehended by the respondents and to enable them to outfit data in reliable and deliberate way. The questionnaire was set up in English. The English variant of questionnaire is encased at Appendix.

Selection of the study area

The survey work was carried out at kaliakoir upazila under gazipur district from 10 June 2018 to 8 December 2018. The main objective of the study was to find out

the density of medicinal plants in the homestedas of the farmers. The study was conducted in two (02) selected unions (Atabaha, Mouchak) of kaliakoir upazila under gazipur District.

The unions were selected on the basis of certain sets of criteria such as-

1. These areas were very promising for medicinal plants cultivation.
2. The study area was known for different homesteads plant production.
3. Medicinal plant production in this area is more probably common.
4. Commercially used raw materials for medicine are collected from this area.

Population and sampling design

For this examination the data were assembled through questionnaire by the specialist himself in the midst of 10 June 2018 to 8 December 2018 using meeting plan organized previously. All that data was collected with the help of Sub-assistant agriculture officer of the study union. The number of growers in the study unions was 140. These 140 families were the constituent population of the study. Among them 60% of the population was randomly selected. This sample was further divided among the villages proportionately that is from Atabaha union 50 and Mouchak union it was 32. Also a reserve list of 10 growers was also prepared as per proportionately. Reserve list was used only when the listed growers was not available.

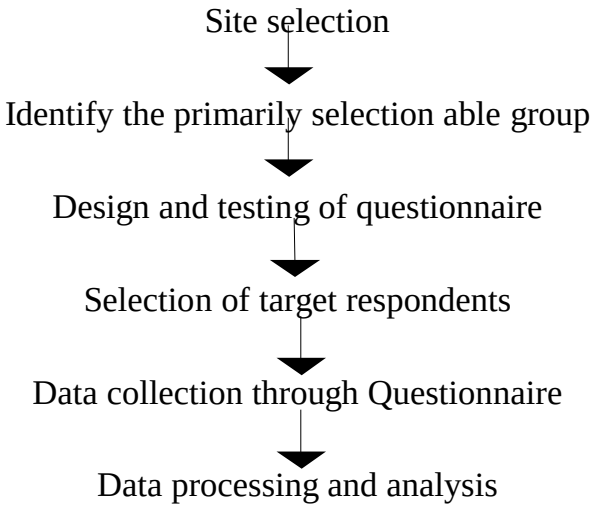
Table 3.1 Sampling population and their distribution

Study area	Unions	Villages	Population Size	Selected Population	Reserve Respondents	Percentage
Kaliakoir, Gazipur	Atabaha	Vataria	46	27	3	60%
		Brishait	39	23	2	
	Mouchak	Shinaba	29	17	3	
		Taltoli	26	15	2	
	Total		140	82	10	

Information collection and conversion

All the information was collected through questionnaire like stepwise and it was asked in the manner that can be understandable to the respondent and later it was converted to the format of the regarding questionnaire pattern. Collecting the information in the local units it was converted in the international unit.

The data collection manner was the following likewise-



The information was entered in to PC by utilizing SPSS bundle program. All the data was arranged in the manner that can be an initial way to enter into the software. Diagram and tables was arranged in the likewise manner that is need to describe.

Fig 2: Collection of data from the study area

3.5 Variables of the Study (Independent variables)

The hypothesis of this research contained at least two important elements Viz., an independent variable and a dependent variable. The independent variables were

i) Age
ii) Education
iii) Family size,
iv) Homestead area
v) Plantation Area
vi) Annual income,
vii) Organizational participation
viii) Training Exposure
ix) Environmental awareness and
x) Knowledge about medicinal plants
xi) Number of medicinal plants in the homesteads

The dependent variable of this study was the Density of medicinal plants in the homestead area.

3.6 Measurement of independent variables

- Age

The age of farmers were measured in terms of years in round figure at the time of interview. A score of 1 was assigned for each year as reported by a farmer.

- Education

The level of education of a farmer was measured by the number of years of schooling. A score of 1 was given for each year of schooling i.e., 10 for S.S.C., 12 for H.S.C and so on. If a farmer did not know how to read and write his literacy score was taken as zero (0).

- Family size

The Family size of a farmer was measured in term of number of members in this family including his wife, children and those who are dependent on his family. The total number of family members was considered as the family size score of a farmer.

- Homesteads area

Homesteads area of the farmers was measured in three different categories named low (2-5 Decimal), medium (4-10 Decimal) and high (above 10 Decimal) area. As the number of area is too small therefore it was taken in the decimal.

- Plantation Area

The plantation area of a farmer was measured to the total area of land on which family carried operation of tree plantation. The farm size of a farmer was

expressed as decimal as there are not enough respondents that who has a higher plantation area.

Categories	**Basis of categorization (Decimal)**
Small plantation area	4-20
Medium plantation area	21–40
Large plantation area	Above 40

- Annual income from medicinal plant

Annual income from medicinal plant of a farmer was measured in taka on the basis of his total yearly earnings from medicinal plants timber, bark, leaf, root, flower, fruit and other sources as contained in the interview schedule. A score of 1 was given for each thousand taka.

Categories	**Basis of categorization ('1000' BDT)**
Low income	1-3
Medium income	4-6
High income	Above 6

- Organizational participation

Organizational participation of farmer was measured on the basis of the nature of his involvement in different local, formal and informal groups in the study area as shown in the item no. 7 of the interview schedule (Appendix– VI). Participation score was computed in the following manners for each organization

Nature of participation	Score assigned
Not involved	0
Ordinary member	1
Executive member	2
Executive of officer	3

For measuring the duration score, a score of 1 was assigned for each year of the participation in each organization. Organizational participation of a farmer was measured according to the nature and duration of his participation in different organization. For computing organizational participation score the following formula was used –

Organization participation = ΣP x D

- Where,
- P = Participation score
- D = Duration score
- Duration score was assigned in the following manner-

Duration of activities	**Score assigned**
Nil period	0
One year	1
Two year	2
Three year	3

Categories was selected as the followings-

Categories	**Basis of categorization (scores)**
No participation	0
Low participation	1-4
Medium participation	5-8
High participation	Above 8

- Training Exposure

Total number of days a farmer took training from any sources are enlisted as the training exposure. Total number of days was count as the score of the training exposure.

Categories	Basis of categorization(Days)
No training	0
Low training	1-3
Medium training	4-6
High training	Above 6

- Environmental awareness

Environmental awareness is characterized as awareness about the presence of ecological contamination brought about by rural and non-agrarian movement yet missing point by point data. There few questions were asked and data gathered. Each question was marked 2.

Categories (scores)	Basis of categorization (scores)
Low awareness	1-3
Medium awareness	4-5
High awareness	Above 5

- Knowledge about medicinal plants

It alludes to the information picked up by the farmers structure diverse sources and furthermore through their encounters to use medicinal plants. Farmers were made eight inquiries. Each inquiry was scored 2. On the off chance that a farmer responded to every one of the inquiries, he/she scored 8 and who couldn't address any of the inquiries he got zero (0).

Categories	Basis of categorization(Score)
Low knowledge	1-4
Medium knowledge	5-6
High knowledge	Above 6

- Number of medicinal plants

The number of medicinal plants that grows by the farmers is included in this point. Every single unit numbered 1.

Categories (scores)	**Basis of categorization(scores)**
Low medicinal plants	1-3
Medium medicinal plants	4-17
High medicinal plants	Above 17

3.7 Measurement of dependent factors

Density of medicinal plants was the depended variable of the investigation. Farmers referenced the medicinal plants of their estate and total number of plants that they grow in their homesteads therefore it was then formulated to identify the density of medicinal plants frown by the farmers in the homesteads in kaliakoir of Gazipur.

CHAPTER 4

RESULT AND DISCUSSION

This chapter deals with the result and discussion of present research work. Necessary explanations and appropriate interpretations have also been made showing possible and logical basis of the findings. However, for convenience of the discussions, the findings are systematically presented in the following sections.

4.0 Density of medicinal plants

Density of medicinal plants is the ratio of the number of medicinal plants species and the total species the grower have in the homesteads. It shows as the percentage as it was multiplied by the hundred. Density of the medicinal plants was measured by the following formula.

Density of Medicinal Plants = Number of medicinal plants/Number total plants x 100

In the study area there are 23 medicinal plants species are mentioned by the people that they use as the medicinal plants. General commonness of the medicinal plants has been shown in the below table. They most noteworthy predominant species in the study area that was used as the medicinal plants by the people of the study arena was Bel (2.41%), Desi Neem (1.35%), Sajna (1.25%), Akon (0.73%) and Tulsi (0.72%). These species was found practically in the homesteads and people of the study area uses as the mentioned species as they know the facts of these trees from the ancient time. Again soil factors and distribution and others factors are also responsible for the selection of the species. The other tree species found in the homesteads was predominantly as Akasmoni (17.17%), Eucalyptus (13.82%), Shal (12.10%), Mahagoni (10.51%), Supari (3.02%).

Table 4: Density of the plants species in the homesteads of the study area

A.	**Medicinal Plants density in the homesteads**		
Sl	**Name of**	**Scientific Name**	**Density (%)**
01	Bel	*Aegle mermelos*	2.4128
02	Sajna	*Moringa olefera*	1.2504
03	Neem (Desi)	*Azadirachta indica*	1.3561
04	Neem (Ghora)	*Azadirachta indica*	0.8101
05	Akon	*Calotropic gigantean*	0.7396
06	Arjun	*Terminalia arjuna*	0.5811
07	Bohera	*Terminalia belerica*	0.4597
08	Tulsi	*Ocimum sanctum*	0.7220
09	Thankuni	*Hydrocotyle asiatica*	0.5635
10	Shimul	*Bombax ceiba*	0.2635
11	Kamranga	*Averrhoa carambola*	0.4050
12	Khejur	*Lisea monpetala*	0.5459
13	Anaros	*Annasus comosus*	0.2817
14	Patharkuchi	*Kalanchoe pinnata*	0.5107
15	Tejpata	*Cinnamomum tamala*	0.2994
16	Bishkathali	*Persicria hydropiper*	0.5459
17	Basok	*Adhatoda vasica*	0.5283
18	Nisindha	*Vitex negundo*	0.2817
19	Lazzaboti	*Mimosa pudica*	0.2830
20	Ulotkambol	*Abroma augusta*	0.2465
21	Amloki	*Phyllanthus emblica*	0.2289
22	Kodbel	*Limonia acidissima*	0.1761
23	Tetul	*Tamarindus indica*	0.4226
B.	**Others tree species density in the homesteads**		
24	Eucalyptus	*Eucalyptus globules*	13.82
25	Accacia	*Acacia mangium*	1.75

26	Mahagoni	*Swietenia mahagoni*	10.51
27	Rain Tree	*Samanea saman*	2.18
28	Chambol	*Lageristroma speciosa*	1.81
29	Khoir	*Accacia catechu*	1.51
30	Bot	*Ficus benghalensis*	1.36
31	Shal	*Shoera robusta*	12.10
32	Bohera	*Terminalia belerica*	1.40
33	Sada koroi	*Albizia lucida*	2.63
34	Kalo Koiroi	*Albizia lebbek*	2.49
35	Hijol	*Barringtonia acutangula*	1.79
36	Kathal	*Artocarpus heterophylus*	1.96
37	Aam	*Mangifera indica*	1.40
38	Chatim	*Alstonia scholaris*	1.47
39	Peyara	*Psidium guajava*	2.12
40	Ammra	*Spondias mombin*	2.55
41	Kat Badam	*Prunus dulcis*	1.65
42	Shimul	*Bombax ceiba*	1.47
43	Mander	*Erythrina Indica*	1.24
44	Debdaru	*Polyalthia longifolia*	0.97
45	Akasmoni	*Accacia spp.*	17.17
46	Coconut	*Cocos nucifera*	1.18
47	Tetul	*Tamarindus indica*	0.96
48	Litchi	*Litchi sinensis*	1.81
49	Gab	*Diospyros discolor*	2.32
50	Supari	*Areca catechu*	3.02
51	Tal	*Borassus flabellifer*	1.75
52	Jolpai	*Elaeocarpus serratus*	2.02
53	Chalta	*Dillenia indica*	1.49
54	Lebu	*Citrus lemon*	0.98

Medicinal plants like Bel is found more often in the whole Bangladesh but profoundly found in the area of Bhawal Madupur tract (study area is in this region) that is the region in Dhaka, Mymensingh, Tangail and closest Gazipur. The study refers that there is more often use of Bel than any other medicinal plants in the study area.

4.1 Characteristics of the Farmers

This section deals with the selected characteristics of farmers which were assumed to be associated with the density of medicinal plants of the farmers. Different farmers possess different characteristics which are focused by his/her behavior. In this section 11 characteristics have been discussed. The selected characteristics of the farmers were; age, education, family size, homestead area, plantation area, annual income from medicinal plants, organizational participation, training exposure, environmental awareness, knowledge about medicinal plants, total number of plants and medicinal plants. Measuring unit, range, mean and standard deviations of those characteristics of farmers were described in this section. Table 4.1 provides a summary profile of farmers' characteristics.

Table 4.1: Characteristics profile of the respondents (Independent Variables)

Characteristics (with measuring unit)	Range		Mean	SD
	Possible	Observed		
Age (years)	Unknown	23–60	40.35	9.35
Level of education (schooling years)	Unknown	0.0 – 16	6.67	3.58
Family size (members)	Unknown	3-10	5.42	1.53
Home area (decimal)	Unknown	3-15	7.48	2.79
Plantation area decimals	Unknown	4–150	18.55	16.60
Annual income from medicinal plants	Unknown	1–10	2.37	1.58

Organizational participation	Unknown	0–14	3.32	3.08
Training exposure (Number of days)	Unknown	0–11	2.52	2.36
Environmental awareness	0 – 10	1-9	4.09	1.89
Knowledge about medicinal plants	0-10	1-9.5	5.32	1.57
Number of plants				
Total number of plants	Unknown	5-250	59.85	41.97
Medicinal plant	Unknown	1-35	10.08	7.12

4.1.1 Age

Age of the respondents varied from 23 to 60 years, the average being 40.35 years with the standard deviation of 9.35. According to their age, the respondents were classified into three categories as "young aged", "middle aged" and "old aged". The distribution of the farmers according to their age is shown in Table 4.2.

Table 4.2: Distribution of the farmers according to their age

Categories	**Basis of categorization (year)**	**Respondents**	
		Numbers	**Percent**
Young aged	23-35	36	43.9
Middle aged	36-50	30	36.6
Old aged	Above 50	16	19.5
Total		82	100

Data represented in Table 4.2 indicate that the young aged farmer comprised the highest proportion (43.9 percent) followed by middle aged category (36.6 percent) and the lowest proportion were made by the old aged category (19.5 percent). Data also indicates that the young to middle aged respondents constitute almost 80.5 percent of total respondents. The young and middle-aged respondents were generally more involved in tree plantation.

4.1.2 Level of Education

Education level of the respondents ranged from 0-16 in accordance with year of schooling. The average education score of the respondents was 6.67 with a standard deviation of 3.58. On the basis of their level of education, the farmers were classified into four categories as shown in Table 4.3.

Table 4.3: Distribution of the farmers according to their level of education

Categories	Basis of Categorization (schooling years)	Respondents	
		Number	Percent
Illiterate	0	7	8.5
Primary	1-5	44	53.7
Secondary	6-10	22	26.8
Higher secondary	Above 10	9	11
Total		82	100

Data shown in the Table 4.3 indicates that respondent primary level of education constitute the highest proportion (53.7 percent) followed by secondary level of education category (26.8 percent). On the other hand, the lowest proportion (8.5 percent) in illiterate category followed by higher secondary level of education category (11 percent).

4.1.3 Family size

Family size of the respondents ranged from 3 to 10 members with the mean of 5.42 and standard deviation of 1.53. On the basis of their family size, the farmers were classified into three categories presented as shown in Table 4.4

Table 4.4: Distribution of the farmers according to their family size

Categories	Basis of categorization (Member)	Respondents	
		Number	Percent
Small family	3-4	28	34.1
Medium family	5–6	41	50
Large family	Above 6	13	15.9
Total		82	100

Data presented in the Table 4.4 demonstrated that highest proportion (50 percent) of the farmers had medium family size compared to 34.1 percent having small family size and 15.9 percent farmers had large family size.

4.1.4 Homestead area

Homestead area of the respondents ranged from 3 decimal to 15 decimals with the mean of 7.48 and standard deviation of 2.79. On the basis of their homestead area, the farmers were classified into three categories presented as shown in Table 4.5.

Table 4.5: Distribution of the farmers according to their homestead area

Categories	Basis of categorization (Decimal)	Respondents	
		Number	Percent
Small homestead	3-5	27	32.9
Medium homestead	4 –10	52	63.4
Large homestead	Above 10	3	3.7
Total		82	100

Data presented in the Table 4.5 demonstrated that highest proportion (63.4 percent) of the farmers had medium homestead area compared to 32.9 percent having medium small homestead area and 3.7 percent farmers had large homestead.

4.1.5 Plantation area

Plantation area of the farmers varied from 4 to 150 decimals with an average of 18.55 and standard deviation of 16.60. Based on their plantation area, the farmers were classified into three categories namely small plantation area (4-20 decimal), medium plantation area (21-40) and large plantation area (above 40). The distribution of the farmers according to their plantation area is presented in Table 4.6.

Table 4.6: Classification of the respondents according to their plantation area

Categories	Basis of categorization (Decimal)	Respondents	
		Number	Percent
Small plantation area	4-20	63	76.8
Medium plantation area	21–40	17	20.8
Large plantation area	Above 40	2	2.4
Total		82	100

Data presented in Table 4.6 indicates that majority (76.8 percent) of the respondents had small plantation area compared to 20.8 percent of the respondents had medium plantation area and 2.4 percent had high large plantation area.

4.1.6 Annual income from medicinal plants

Annual income from medicinal plant of the respondents ranged from 1 to 10 thousand taka. The mean was 2.31 thousand taka and standard deviation was 1.58. On the basis of annual family income, the respondents were categorized into three groups as shown in Table 4.7.

Table 4.7: Distribution of the farmer according to their annual income from medicinal plants

Categories	Basis of categorization ('1000' BDT)	Respondents	
		Number	Percent
Low income	1-3	12	14.6
Medium income	4-6	67	81.7
High income	Above 6	3	3.7
Total		82	100

Data shown in Table 4.7 presented that the highest proportion (81.7 percent) of the respondents had medium income from medicinal plant while 14.6 and 3.7 percent of the respondents had low and high income from medicinal plant respectively.

4.1.7 Organizational participation

Organizational participation of the farmers varied from 0 to 14 with an average of 3.32 and standard deviation of 3.08. Based on their organizational participation, the farmers were classified into four categories namely no participation (0), low participation (1-4), medium participation (5-8) and high participation (above 8). The distribution of the farmers according to their organizational participation is presented in Table 4.8.

Table 4.8: Classification of the respondents according to their organizational participation

Categories	Basis of categorization (scores)	Respondents	
		Number	Percent
No participation	0	16	19.5
Low participation	1-4	48	58.5
Medium participation	5-8	11	13.5
High participation	Above 8	7	8.5
Total		82	100

Data presented in Table 4.8 indicates that majority (58.5 percent) of the respondents had low participation against 19.5 percent of the respondents had no participation and 13.5 percent had medium participation and only 8.5 percent of the farmers had high participation.

4.1.8 Training exposure

The score of training exposure of the farmers ranged from 0-11 days. The mean was 2.52 days and standard deviation was 2.36. On the basis of training, the respondents were categorized into four groups as shown in Table 4.9.

Table 4.9: Distribution of the farmer according to their training exposure

Categories	Basis of categorization (Days)	Respondents	
		Number	Percent
No training	0	22	26.8
Low training	1-3	41	50
Medium training	4-6	12	14.7
High training	Above 6	8	8.5
Total		82	100

Data presented in the Table 4.9 showed that about (50 percent) of the farmers had low training exposure; while only8.5 percent of the farmers had high training exposure. Where, 26.8% farmers had no training and 14.7% of the farmers had medium training exposure.

4.1.9 Environmental awareness

Computed scores of the farmers about environmental awareness ranged from 1 to 9 with a mean of 4.09 and standard deviation of 1.89. On the basis of awareness, the respondents were classified into three categories as follows in Table 4.10.

Table 4.10: Distribution of the farmers according to their awareness

Categories (scores)	Basis of categorization (scores)	Respondents	
		Number	Percent
Low awareness	1-3	28	34.1
Medium awareness	4-5	32	39.1
High awareness	Above 5	22	26.8
Total		82	100

Data contained in Table 4.10 showing that 39.1 percent of the farmers had medium awareness, whereas 34.1 percent had low awareness and 26.8 percent had high awareness. Awareness is helpful to increase knowledge, improve skill and change attitude of the farmers. It also builds confidence of the farmers for making appropriate decisions at the time of need.

4.1.10 Knowledge about medicinal plants

The observed knowledge scores of farmers ranged from 1 to 9.50 against the possible range from 0 to 10, the mean and standard deviation were 5.32 and 1.57 respectively. According to this score, the farmers were classified into three categories: “low knowledge” (1-4), “medium knowledge” (5-6) and “high knowledge” (above 6). The distribution of the farmers according to their knowledge is shown in Table 4.11

Table 4.11: Distribution of the farmers according to their knowledge

Categories	Basis of categorization (Score)	Respondents	
		Number	Percent
Low knowledge	1-4	20	24.4
Medium knowledge	5-6	45	54.9
High knowledge	Above 6	17	20.7
Total		82	100

Data presented in the Table 4.11 showed that a proportion of 54.9 percent of the farmer had medium knowledge compared to 24.4 percent of them having low knowledge and 20.7 percent of the farmer had high knowledge. Thus, overwhelming majority (79.3 percent) of the farmer had low to medium knowledge. Knowledge is a very effective and powerful source of receiving information about various new and modern technologies. The status of no or having low and medium knowledge might have significant impacts on use of medicinal plant plantation.

4.1.11 Total number of plants

Computed scores of the farmer's total number of plants ranged from5 to 250 with a mean of 59.85 and standard deviation of 41.97. On the basis of total number of plants, the respondents were classified into three categories as follows in Table 4.12.

Table 4.12: Distribution of the farmers according to their total number of plants

Categories (scores)	Basis of categorization (scores)	Respondents	
		Number	Percent
Low plants	1-50	55	67.1
Medium plants	51-100	17	20.7
High plants	Above 100	10	12.2
Total		82	100

Data contained in Table 4.12 showing that 67.1 percent of the farmers had low number of trees, whereas 20.7 percent had medium number of total plants and 12.2 percent had high total number of plants.

4.1.12 Number of medicinal plants

Computed scores of the farmer's number of medicinal plants ranged from 1 to 35 with a mean of 10.08 and standard deviation of 7.12. On the basis of number of medicinal plants, the respondents were classified into three categories as follows in Table 4.13.

Table 4.13: Distribution of the farmers according to their number of medicinal plants

Categories (scores)	Basis of categorization (scores)	Respondents	
		Number	Percent
Low medicinal plants	1-3	16	19.5
Medium medicinal plants	4-17	52	63.4
High medicinal plants	Above 17	14	17.1
Total		82	100

Data contained in Table 4.13 showing that 63.4 percent of the farmers had medium number of medicinal plants, whereas 19.5 percent had low number of medicinal plants and 17.1 percent had high number of medicinal plants.

4.2 Density of medicinal plants (Dependant Variable)

The dependant variable of the study is density of medicinal plants. The scores of densities of the respondents ranged from 1.79 to 56.67 against the possible range of 0-100 with an average of 17.34 and standard deviation of 10.76. Based on the observed scores of densities, the respondents were classified into the three categories i.e. Low densities, Medium densities and High densities. The distribution has been shown in Table 4.14

Table 4.14: Distribution of the farmers according to their densities of medicinal plants

Categories	Basis of categorization (Score)	Respondents	
		Number	Percent
Low densities	1-7	16	19.5
Medium densities	8-27	51	62.2
High densities	Above 27	15	18.3
Total		82	100.0

Data of Table 4.14 show that among the respondents the highest 62.2 percent farmers belong to the group of medium level of densities and the lowest 18.3 percent in high level of densities followed by low level densities (19.5) percent by the farmers. Among the farmers, most of the farmer (81.7 percent) have medium to low level of medicinal plants densities.

4.3 Relationship between selected characteristics of the respondents on their densities of medicinal plants (Relationship of independent and dependent variable)

This section deals with the relationships with eleven selected characteristics of the farmers and their densities of medicinal plants. The selected characteristics constituted independent variables and densities of medicinal plants of the farmers considered as dependent variable. Pearson's product moment correlation co-efficient "r" has been used to test the hypothesis concerning the relationship between two variables. Five percent level of significance was used as the basis for acceptance or rejection of any null hypothesis.

The summary of the result of correlations co-efficient relationship between selected characteristics of the respondents and densities of medicinal plants.

Table 4.15: Co-efficient of correlation showing relationship between selected characteristics of the farmers and their densities of medicinal plants

Predicted variable	Experimental variable	Computed value "r"	Tabulated value of "r"	
			at 0.05 level	at 0.01 level
Densities of medicinal plants	Age	0.384**	0.217	0.283
	Level of education	0.443**		
	Family size	0.178 NS		
	Home area	-0.016 NS		
	Plantation area	-0.094NS		
	Annual income from medicinal	0.239*		
	Organizational participation	0.473**		
	Training exposure	0.373**		
	Environmental awareness	0.211NS		
	Knowledge about medicinal	0.322**		
	Total number of plants	0.067 NS		
	Number of medicinal plants	0.651**		

NS = Not significant

* Significant at 0.05 level of probability

** Significant at 0.01 level of probability

4.3.1 Age and their density of medicinal plants

The relationship between age of the farmers and their density of medicinal plants was examined by testing the following null hypothesis.

"There was no relationship between age of the farmers and their density of medicinal plants."

Co-efficient of correlation between the concerned variable was found to be 'r' = (0.384) as shown in Table 4.15. This led to the following observations regarding the relationship between the two variables under consideration:

- The relationship showed a positive trend.
- The computed value of 'r' = (0.384) which was greater than the table value (r= 0.283) with 80 degrees of freedom at 0.01 level probability.
- The co-efficient of correlation between the concerned variable was significant at 0.01 level of probability.
- The null hypothesis could be rejected.

On the basis of above findings, the null hypothesis could be rejected. Hence, the researcher concluded that age of the farmers had significant and positive relationship with their density of medicinal plants.

4.3.2 Education and their density of medicinal plants

The relationship between education of the farmers and their density of medicinal plants was examined by testing the following null hypothesis.

"There was no relationship between education of the farmers and their density of medicinal plants."

Co-efficient of correlation between the concerned variable was found to be 'r' = (0.443) as shown in Table 4.15. This led to the following observations regarding the relationship between the two variables under consideration:

- The relationship showed a positive trend.
- The computed value of 'r' = (0.443) which was greater than the table value (r= 0.283) with 80 degrees of freedom at 0.01 level probability.
- The co-efficient of correlation between the concerned variable was

significant at 0.01 level of probability.

- The null hypothesis could be rejected.

On the basis of above findings, the null hypothesis could be rejected. Hence, the researcher concluded that education of the farmers had significant and positive relationship with their density of medicinal plants.

4.3.3 Family size and their density of medicinal plants

The computed value of 'r' (0.178) was smaller than that of the tabulated value (r=0.217) with 80 degrees of freedom at 0.05 level of probability as shown in Table 4.15. Hence, the concerned null hypothesis was accepted and it was concluded that family size of the farmers had no significant relationship with their density of medicinal plants.

4.3.4 Homestead area and their density of medicinal plants

The computed value of 'r' (-0.016) was smaller than that of the tabulated value (r=0.217) with 80 degrees of freedom at 0.05 level of probability as shown in Table 4.15. Hence, the concerned null hypothesis was accepted and it was concluded that homestead area of the farmers had no significant relationship with their density of medicinal plants.

4.3.5 Plantation area and their density of medicinal plants

The computed value of 'r' (-0.094) was smaller than that of the tabulated value (r=0.217) with 80 degrees of freedom at 0.05 level of probability as shown in Table 4.15. Hence, the concerned null hypothesis was accepted and it was concluded that plantation area of the farmers had no significant relationship with their density of medicinal plants.

4.3.6 Annual income from medicinal plants and their density of medicinal plants

The relationship between Annual income from medicinal plants of the farmers and their density of medicinal plants was examined by testing the following null hypothesis.

"There was no relationship between annual income from medicinal plants *of the farmers and their density of medicinal plants."*

Co-efficient of correlation between the concerned variable was found to be 'r' = (0.239 as shown in Table 4.15. This led to the following observation regarding the relationship between the two variables under consideration:

- The relation showed a positive trend
- The computed value of 'r'= (0.239) which was greater than the table value (r=0.217) with 80 degrees of freedom at 0.05 level probability.
- The co-efficient of correlation between the concerned variable was significant at 0.05 level of probability.
- The null hypothesis could be rejected.

On the basis of above findings, the null hypothesis could be rejected. Hence, the researcher concluded that annual income from medicinal plants of the farmers had significant relationship with their density of medicinal plants.

4.3.7 Organizational participation and their density of medicinal plants

The relationship between organizational participation of the farmers and density of medicinal plants was examined by testing the following null hypothesis.

"There was no relationship between organizational participation of the farmers and their density of medicinal plants."

Co-efficient of correlation between the concerned variable was found to be 'r' = (0.473 as shown in Table 4.15. This led to the following observation regarding the relationship between the two variables under consideration:

- The relation showed a negative trend
- The computed value of 'r'= (0.473) which was greater than the table value (r=0.283) with 80 degrees of freedom at 0.01 level probability.
- The co-efficient of correlation between the concerned variable was significant at 0.01 level of probability.
- The null hypothesis could be rejected.

Thus, it may be concluded that there was significant and positive relationship between organizational participation and their density of medicinal plants. This means the farmers with high organizational participation had more positive density of medicinal plants than the farmers with organizational participation.

4.3.8 Training exposure and their density of medicinal plants

The relationship between training and their density of medicinal plants was examined by testing the following null hypothesis.

"There was no relationship between training of the farmers and their density of medicinal plants.''

Co-efficient of correlation between the concerned variables was found to be 'r' = (0.373) as shown in Table 4.15. This led to the following observation regarding the relationship between the two variables under consideration:

- The relationship showed a positive trend.
- The computed value of 'r'= (0.373) which was greater than the table value (r= 0.283) with 80 degrees of freedom at 0.01 level probability.
- The co-efficient of correlation between the concerned variable was significant at 0.01 level of probability.
- The null hypothesis could be rejected.

On the basis of above findings, the null hypothesis could be rejected. Hence, the researcher concluded that training of the farmers had highly significant relationship with their density of medicinal plants.

4.3.9 Environmental awareness and their density of medicinal plants

The computed value of 'r' (0.211) was smaller than that of the tabulated value (r=0.217) with 80 degrees of freedom at 0.05 level of probability as shown in Table 4.15. Hence, the concerned null hypothesis was accepted and it was concluded that environmental awareness of the farmers had no significant relationship with their density of medicinal plants.

4.3.10 Knowledge about medicinal plants and their density of medicinal plants

The relationship between knowledge about medicinal plants of the farmers and their density of medicinal plants was examined by testing the following null hypothesis.

"There was no relationship between knowledge about medicinal plants of the farmers and their density of medicinal plants."

Co-efficient of correlation between the concerned variable was found to be 'r' =

(0.322) as shown in Table 4.15. This led to the following relationship between the two variables under consideration.

- The relationship showed a positive trend.
- The computed value of "r" = (0.322) which was greater than the table value (r= 0.283) with 80 degrees of freedom at 0.01 level probability.
- The co-efficient of correlation between the concerned variable was significant at 0.01 level of probability.
- The null hypothesis could be rejected.

On the basis of above findings, the null hypothesis could be rejected. Hence, the researcher concluded that knowledge about medicinal plants of the farmers had significant relationship with their density of medicinal plants.

4.3.11 Total number of plants and their density of medicinal plants

The computed value of 'r' (0.067) was smaller than that of the tabulated value (r=0.217) with 80 degrees of freedom at 0.05 level of probability as shown in Table 4.15. Hence, the concerned null hypothesis was accepted and it was concluded that total number of plants of the farmers had no significant relationship with their density of medicinal plants.

4.3.12 Number of medicinal plants and their density of medicinal plants

The relationship between number of medicinal plants of the farmers and their density of medicinal plants was examined by testing the following null hypothesis.

"There was no relationship between number of medicinal plants of the farmers and their density of medicinal plants."

Co-efficient of correlation between the concerned variable was found to be 'r' = (0.651) as shown in Table 4.15. This led to the following relationship between the two variables under consideration.

- The relationship showed a positive trend.
- The computed value of "r" = (0.651) which was greater than the table value (r= 0.283) with 80 degrees of freedom at 0.01 level probability.
- The co-efficient of correlation between the concerned variable was significant at 0.01 level of probability.
- The null hypothesis could be rejected.

On the basis of above findings, the null hypothesis could be rejected. Hence, the researcher concluded that number of medicinal plants of the farmers had significant relationship with their density of medicinal plants.

CHAPTER 5
SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 SUMMARY

The study was done at four villages under Kaliakoir Upazila in Gazipur area. The information was gathered through the questionnaire. The example respondents for the examination comprised of 82 family units. Among them 82 questionnaire was prepared. The homestead families were chosen arbitrarily. So as to gather significant data information were gathered through questionnaire by the specialist himself from the example farmers amid 10 July to 8 December 2018 utilizing a questionnaire. At that point the gathered information was condensed to meet the destinations. Information was investigated to satisfy different targets of the examination.

Density of medicinal plants in the homesteads was the dependent variable of the investigation. Eleven chose qualities of the farmers were taken as autonomous factors. The attributes were age, education, family size, homestead area, plantation area, and annual income from medicinal plants, organizational participation, training exposure, and environmental awareness, knowledge about medicinal plants and total number of plants and number of medicinal plants.

In the examination territory and a total no of 23 medicinal plant species were recognized in the front yard, backyard and boundaries of homesteads. Farmers utilized medicinal plants for illnesses of infections and now and again as pesticide too

The highest proportion (43.9 percent) of the farmers was young aged while 19.5 percent was old and 36.6 percent was middle aged. The highest proportion (53.7 percent) of the respondent had primary level of education, while 26.8 percent had secondary level of education, 8.5 percent had illiterate and 11 percent had above secondary level of education. The highest proportion (50 percent) of the farmers

had medium family size, while 34.1 percent had small family size and 15.9% had large family size. The observed homestead area scores of the farmers ranged from 5 to 15 decimal with the mean of 7.48. The highest proportion (63.4 percent) of the farmers had medium homestead area; while 32.9 percent had small homestead area and 3.7 percent farmers had large homestead area. The observed plantation area scores of the farmers ranged from 4 to 150 decimal with the mean of 18.55. The highest proportion (76.8 percent) of the farmers had small plantation area; while 20.8 percent had medium plantation area and 2.4 percent farmers had large plantation area. Annual income from medicinal plants of the farmers ranged from 1 to 10 thousand Tk. with the mean of 2.31 thousand Tk. The highest proportion (81.7 percent) of the farmers had medium annual family income from medicinal plants compared with 14.6 percent and 3.7 percent having low and high annual family income from medicinal plants respectively.

The highest proportion (58.5 percent) of the farmers had low organizational participation, while 19.5 percent of the farmers had no organizational participation, 13.5 percent of the farmers had medium organizational participation and 8.5 percent had high organizational participation. The observed training scores of the farmers ranged from 0 to 11 with the mean of 2.52. The highest proportion (50 percent) of the farmers had training low training; while 26.8 percent had no training, 14.7 percent of the farmers had medium training and only 8.5 percent farmers had high training exposure.

The observed awareness scores of the farmers ranged from 1 to 9 with the mean of 4.09. The highest proportion (39.1 percent) of the farmers had medium environmental awareness; while 34.1 percent had low and 26.8 percent farmers had high awareness in environment.

Knowledge about medicinal plants ranged from 1 to 9.50 with an average 5.32 and standard deviation 1.57. The highest proportion (54.9 percent) of the respondents

of the study area had the medium knowledge about medicinal plants, while 24.4 percent had low knowledge about medicinal plants and 20.7 percent had high knowledge about medicinal plants.

Total number of plants ranged from 5 to 250 with an average 59.85 and standard deviation 41.97. The highest proportion (67.1 percent) of the respondents of the study area had the low number of plants, while 20.7 percent had medium number of total plants and 12.2 percent had high number of total plants.

Number of medicinal plants ranged from 1 to 35 with an average 10.08 and standard deviation 7.12. The highest proportion (63.4 percent) of the respondents of the study area had the medium number of medicinal plants, while 19.5 percent had low number of medicinal plants and 17.1 percent had high number of medicinal plants.

The density of medicinal plants of the farmer's scores of the farmers ranged from 1.79 to 56.67 with an average of 17.34 and the standard deviation 10.76. The highest proportion 62.2 percent of the farmers fell under medium density of medicinal plants of the farmer's category while 19.5 percent had low densities of medicinal plants and 18.3 percent had high densities of medicinal plants.

Age, level of education, annual family income from medicinal plants, organizational participation, training exposure, knowledge about medicinal plants and number of medicinal plants had significant positive contribution to their densities of medicinal plants. Characteristics of the farmers like family size, homestead area, plantation area, environmental awareness and total number of plants had no significant contribution with their densities of medicinal plants.

5.2 CONCLUSION

Medicinal plants were observed in Kaliakoir upazila under Kaliakoir locale is a promising wellspring of assembling present day medicinal drug in Bangladesh. A rare of 23 critical types of medicinal plants is frequently utilized by the general population of the study area. They are in fulfillment by utilizing existing species to be specific was Bel (2.41%), Desi Neem (1.35%), Sajna (1.25%),Akon (0.73%) and Tulsi (0.72%)exceptionally utilized in kaliakoir upazila of Gazipur. It was found that Bel is used (2.41%) as the mostly used medicinal plant in the study area as respondents have an ancient idea about it.

- ✓ In the study area farmers had density of medicinal plants in various extents. There were 62.2% medium density of medicinal plants, 18.3% had high density of medicinal plants and 19.5% had low density of medicinal plants. Therefore, it may be concluded that farmers of the study area all were density of medicinal plants in variety of degrees.
- ✓ A great majority (81.5 percent) of the farmers had young to middle aged, and there was a positive significant relationship between farmers' age and their density of medicinal plants.
- ✓ Majorities (53.7 percent) of the farmers were illiterate. There existed a positively significant relationship between farmers' education and their density of medicinal plants.
- ✓ The majority (81.7 percent) of the farmers had low annual income from medicinal plants, while there had a very strong positive significant relationship between annual income from medicinal plants and their density of medicinal plants.
- ✓ A great majority (78.0 percent) of the farmers had low to no organizational participation, while there had a very strong positive significant relationship between organizational participation and density of medicinal plants.
- ✓ A major portion (76.8 percent) of the farmers had low to no training, while

there had a positive significant relationship between training exposure and their density of medicinal plants.

- ✓ A great majority (79.3 percent) of the farmers had medium to low knowledge about medicinal plants, while there had a very strong positive significant relationship between knowledge about medicinal plants of the farmers and their density of medicinal plants.

5.3 RECOMMENDATIONS

From this study author's recommendation is –

1. Medicinal plants are not well recognized by the growers; meanwhile they are using the plants more frequently.
2. Young to middle aged people is well known with use and benefits of medicinal plants and also, they are aware of what species is to plant in the homesteads. But a number of family are led by the old age people are not concern it, so need to take in task through organizational participation.
3. It is better to create interview schedule in bangle name meanwhile the species are known to grower in the name as Bengali format. Researcher need to know the local name as well as the scientific and the English name at a time.
4. Respondents found a little concern about the medicinal plants environmental impact so they are not serious about it. Author finds a scope to improve this part.
5. Visiting hour during must not be within the time of working hour and fast rapport establishment is another problem for the researcher; otherwise information may not get properly.
6. Difficulties are often shown while collecting data people do not know why they have planted the species that shows the lack of knowledge that create problem to the researcher, therefore further study is need to operate in the respected area to have a more clear and other information in the deep aspect.

CHAPTER 6

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APPENDIX-I

Correlation matrix between dependent and independent variables

	X_1	X_2	X_3	X_4	X_5	X_6	X_7	X_8	X_9	X_{10}	X_{11}	X_{12}	Y
X_1	1												
X_2	.157	1											
X_3	.277*	.210	1										
X_4	.225*	.353**	.322**	1									
X_5	-.034	.251*	.101	.331**	1								
X_6	.059	.359**	.077	.115	.279*	1							
X_7	.308**	.585**	.243*	.255*	.315**	.304**	1						
X_8	.325**	.482**	.348**	.208	.373**	.084	.513**	1					
X_9	.132	.462**	.187	.347**	.335**	.244*	.532**	.278*	1				
X_{10}	.134	.459**	.178	.153	.273*	.364**	.472**	.262*	.416**	1			
X_{11}	.057	.403**	.293**	.600**	.730**	.319**	.481**	.303**	.569**	.413**	1		
X_{12}	.331**	.637**	.298**	.448**	.353**	.475**	.673**	.427**	.552**	.531**	.625**	1	
Y	.384**	.443**	.178	-.016	-.094	.239*	.473**	.373**	.211	.322**	.067	.651**	1

**Significant at 1 percent level and *Significant at 5 percent level

X_1=Age	X_8=Training exposure
X_2=Education	X_9=Environmental awareness
X_3=Family size	X_{10}=Knowledge about medicinal plants
X_4=Homestead area	X_{11}=Total number of plants
X_5=Plantation area	X_{12}=Number of medicinal plants
X_6=Annual income from medicinal plants	Y= A study on the density of medicinal plants of the farmers grown on homestead in Kaliakoir upazila of Gazipur district
X_7=Organizational participation	