



Evaluation of Water Management and Agronomic Practices at Command Area of Dargai Irrigation Scheme at District Malakand

Khan N^{1*}, Alam F², Hassan SU³, Ahmad I² and Khan S²

¹Department of Agronomy, The University of Agriculture, Peshawar, Pakistan

²Department of Water Management, The University of Agriculture, Peshawar, Pakistan

³Department of Environmental Sciences, COMSATS Institute of Information Technology, Abbottabad, Pakistan

*Corresponding author: Khan N, Department of Agronomy, The University of Agriculture, Peshawar, Pakistan, Tel: +92919221144; E-mail: nangialkhan@hotmail.com

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Abstract

The land holding status of the command area was determined at head middle and tail reaches of the canal. The farm size at head reaches ranged from 0.40 to 3.4 ha with an average of 1.8 ha, at the middle reaches 1.62 to 3.6 ha with an average of 2.6 ha while at tail reaches ranged from 0.5 to 2.8 ha with an average of 1.8 ha for each farmer. The tenancy status showed that most of the farmers of the command area were owner. The number of owners was 56% out of the total number of farmers. There were 36% tenants in the command area, while the number of owners cum tenant was 8% out of the total farmers. The cropping pattern was determined for two seasons i.e., Rabi and kharif. There were four major crops in the area named as wheat, sugar cane, maize and tobacco. There were two crops in the Rabi season i.e., wheat and sugar cane. Wheat was the dominant crop of the command area in the Rabi season which covered 48% of the total command area followed by sugar cane which covered 44% of the total command area, while only 8% of the total commands area was fallow. The average yield of wheat was 4280 kg/ha at head reaches, 4877 kg/ha at middle reaches and 4958 kg/ha at tail reaches of the canal. The average yield of raw sugar was 5475 kg/ha at head, 5932 kg/ha at middle, and 5899 kg/ha at tail reaches. The average yield of Maize was 5171 kg/ha at head reaches, 6092 kg/ha at middle and 5863 kg/ha at tail reaches. The average yield of Tobacco was 5000 kg/ha at head reaches, 4700 kg/ha at middle and 4125 kg/ha at tail reaches. Number of irrigations was about same at head, middle and tail of the canal because farmers followed pakka warabandi system. The average number of irrigations were 5 for wheat, 7 for maize, 22 for sugar cane and 8 for tobacco. In agronomic practices mainly studied were related to yield improvement factors and agriculture production problems. These factors were studied at the head middle and tail of the canal. Most of the yield improvement factors which were pointed out by the farmers were common at the three selected sites of the canal. Some of these factors which improve yield were availability of sufficient water, insecticides, pesticides, fertilizers and low cost and high-quality seed varieties, lining of canals and watercourses, farmers education and awareness in farmers etc. The second point which was mainly focused was the agriculture production problems. The main agriculture production problems were silt deposition in canals and watercourses, lack of education in farmers, high cost and low-quality seeds, small land holding, insufficient water availability and subsidies etc.

Keywords: Water; Agronomic practices; Dargai irrigation scheme

Introduction

Water is one of the essentials of life and any kind of life is impossible without it. It is needed by both animals and plants for their survival. Water needed by plants for their growth may come from precipitation or irrigation. Precipitation is the natural fall of water on earth, in any form i.e., rainfall, snow etc. While irrigation is the artificial supply of water to the crop fields and is defined as “the provisions of measures that enables users to adequately supply their crops with water which is collected elsewhere” [1].

Agriculture is the largest user of water as 70% of available water goes to agriculture. So, it is the area where future shortage will be more acute, and their effects will be terrible. To avoid this acute shortage of water, proper water management practices are necessary. It will be the appropriate solution of the problem to manage and use this water efficiently and judiciously, because of the rising demands for food, shelter and clothing by an ever-burgeoning world population has led to over exploitation of scarce water resources.

Irrigation can be done in several ways; the most important for our country is surface irrigation. It comprises of a network of canals, distributaries and water courses which finally take water to the farmer's ditches and fields.

Pakistan has one of the largest canal irrigation networks in the world. Pakistan is number two, in terms of canal irrigation among the renowned agricultural countries of the world, the number one being Egypt Irrigated cultivation of Pakistan is as high 72% compared to 15% of the world, 24% of India, 49% of Israel, 15% of Thailand and just 12% of USA a country which is the biggest in surplus production of agricultural commodities. Irrigated land is twice as productive as rain-fed cropland the one sixth of the world's cropland that is irrigated producing about a third of the world food and currently 235 million ha are under irrigation. Productive agriculture has been made possible only through an extensive irrigation system that traverses the length and breadth of this tract. It is the productive agriculture in this irrigated tract, which sustains our national economy to the maximum. An efficient and smooth irrigation system in Pakistan entirely depends on an equitable flow of water in the rivers, flow from watersheds and rainfall pattern in monsoon.

Despite of the extensive and integrated irrigation system, water still acts as limiting factor, thus retarding Pakistan agriculture production. Ironically, an agricultural country like Pakistan has an import bill of food grains, in millions of dollars. One of the reasons is lack of irrigation water management practices at both system and tertiary level. The system in Pakistan is operating at very low level of efficiency, whether measured in terms of world wide agricultural production standards are in terms of its own potential. Along with this mismatch with in demand and supply, inequitable distribution, high water losses, siltation of canals and watercourses, variation in crop water requirement in rabbi and kharif season and watercourses maintenance are the serious problems. Another reason is our inadequate and inappropriate organizational structure, which appears to be the major constraints retarding the efforts to improve our irrigation system.

About 14 million hectares of the country is irrigated with this system. In Khyber Pakhtunkhwa 0.74 million hectares of land is irrigated which is 44% the total cultivated land. Irrigation is done in the province by canals (84%), tube wells (5%) and other means (6%). There are two types of canals i.e., government owned and private canals. The private canals are constructed and maintained by the users. Water to these channels is diverted from main rivers and streams.

In the canal irrigation system (government owned) water is distributed among the farmers according to the principle of "warabandi", which is set up by the provincial irrigation department (P.I.D). According to this principle individual land holdings are grouped into irrigation units to which water is supplied by a watercourse from a main canal through a distributary. These irrigation units then receive a constant uniform flow of water at the inlet (Mogha) of each watercourse, according to the area of the unit. Within the irrigation units, water is then distributed among the farmers on a rotational basis. The individual dosage received by a farmer is proportional to his land holding.

The farmers getting water through warabandi system are not independent in their choice growing crops. Because they must adjust their cropping patterns according to the available water supply. The water supplied cannot fulfill all the requirements needed by the crop grown [2].

Materials and Methods

Description of the research site

The research site is in the command area of Lower Swat Canal system, with Distributary No. 3 (also called Quaid Abad Distributary). The villages irrigated by this canal are Zoormandi, Muhammad Patty, Navaykalay, Hero Shah and Koper in district Malakand. It is nearly 10 km from Dargai main bazaar toward north-west.

Land holding status

Land holding of each farmer per house hold was determined through "Farmers interview method". The number of farmers interviewed for this purpose was twenty-five. Ten farmers were interviewed at head, seven at middle and eight at the tail of the canal to get a list of sufficient information. The land holding was then determined from the data collected at the head middle and tail of the canal.

Tenancy status

In order to determine the tenancy status of the farmers of the command area of the canal, the farmer's interviews were conducted at the head, middle and tail of the canal. Twenty-five farmers were interviewed, ten at head, seven at middle and eight at tail of the canal. Then the tenancy status was determined based on the data collected.

Cropping pattern

Different crops grown on a certain area is called cropping pattern. The cropping pattern was determined through "Farmers interview method". A profarma was developed which contains different information from the farmers about their crops grown in their areas. Twenty-five farmers were interviewed at head, middle and tail, ten at head, seven at middle and eight at tail. The cropping pattern was then determined from the data collected about various crops grown on that area [3].

Crops yield

In order to determine how much yield each farmer get from their command area; the farmers were interviewed at the three visible sites of the canal i.e. head middle and tail. The number of farmers interviewed was twenty-five (ten at head, seven at middle and eight at tail of the canal). An appreciable amount of data about the crops yield was collected through these interviews. The crops yield was then determined based on the data collected.

Number of irrigations

The number of irrigations was determined by the "farmer's interview method". The farmers were interviewed at the head middle and tail of the canal. Ten farmers were interviewed at head section, seven at middle section and eight at tail section of the canal. The number of irrigations was then determined by the amount of data collected.

Results and Discussion

Land holding status

The land holding status of the command area was determined at head middle and tail reaches of the canal. The farm size at head reaches ranged from 0.40 to 3.4 ha with an average of 1.8 ha, at the middle reaches 1.62 to 3.6 ha with an average of 2.6 ha while at tail reaches ranged from 0.5 to 2.8 ha with an average of 1.8 ha for each farmer (Figure 1).

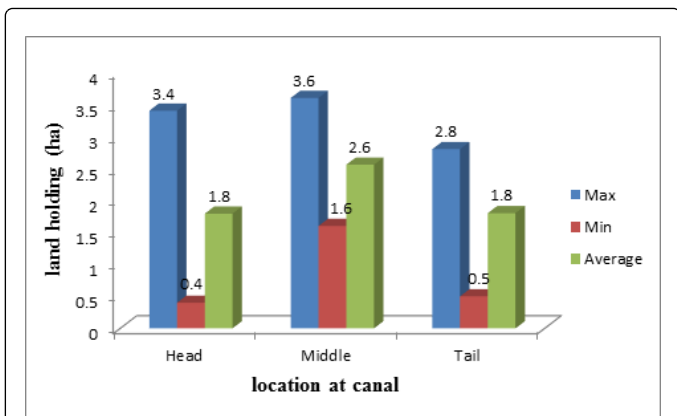


Figure 1: Landholding at head middle and tail reaches of the canal.

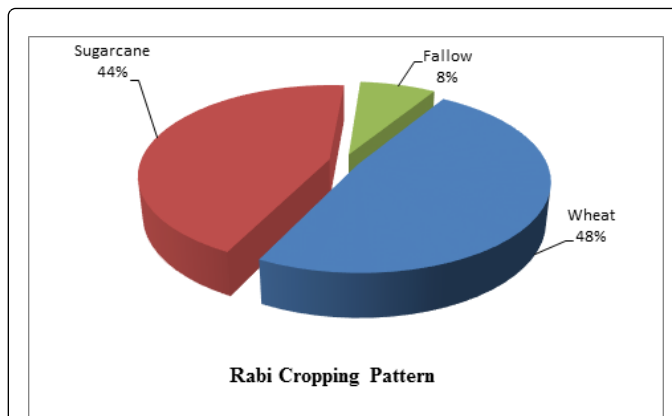


Figure 3: Cropping Pattern of Rabi Season.

Tenancy status

The tenancy status showed that most of the farmers of the command area were owner. The number of owners was 56% out of the total number of farmers. There were 36% tenants in the command area, while the number of owners cum tenant was 8% out of the total farmers (Figure 2).

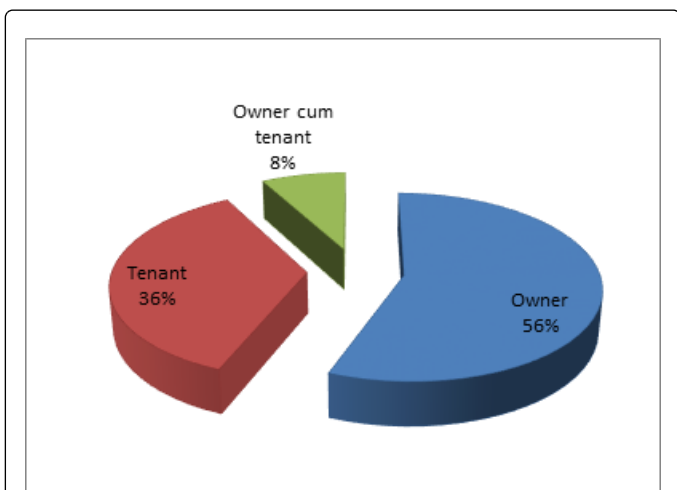


Figure 2: Tenancy Status of the command area.

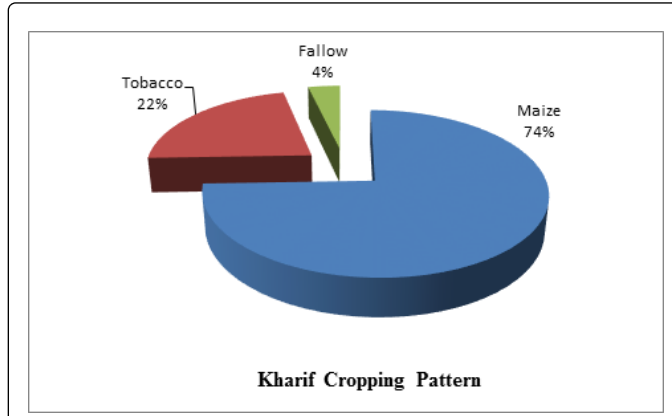


Figure 4: Cropping Pattern of Kharif Season.

Crops yield

The average yield of wheat was 4280 kg/ha at head reaches, 4877 kg/ha at middle reaches and 4958 kg/ha at tail reaches of the canal. The average yield of raw sugar was 5475 kg/ha at head, 5932 kg/ha at middle, and 5899 kg/ha at tail reaches (Figure 5).

The average yield of Maize was 5171 kg/ha at head reaches, 6092 kg/ha at middle and 5863 kg/ha at tail reaches. The average yield of Tobacco was 5000 kg/ha at head reaches, 4700 kg/ha at middle and 4125 kg/ha at tail reaches (Figure 6).

Cropping pattern

The cropping pattern was determined for two seasons i.e., Rabi and kharif. There were four major crops in the area named as wheat, sugar cane, maize and tobacco. There were two crops in the Rabi season i.e., wheat and sugar cane. Wheat was the dominant crop of the command area in the Rabi season which covered 48% of the total command area followed by sugar cane which covered 44% of the total command area, while only 8% of the total commands area was fallow (Figure 3).

Maize was the dominant crop of kharif season which covered 74% of the total command area followed by tobacco which covered 22% of the total command area, while only 4% of the land was fallow (Figure 4).

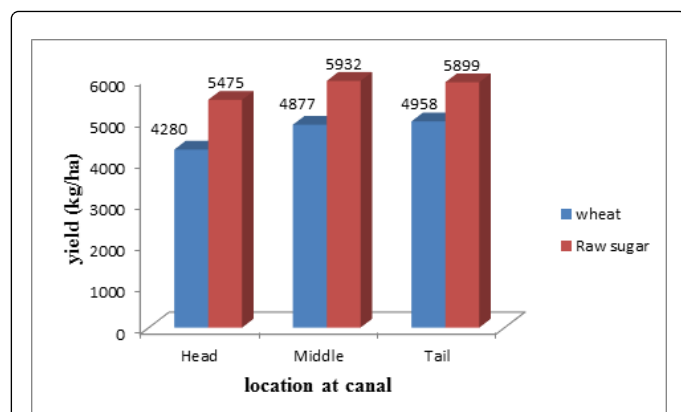


Figure 5: Crops Yield for Rabi Season.

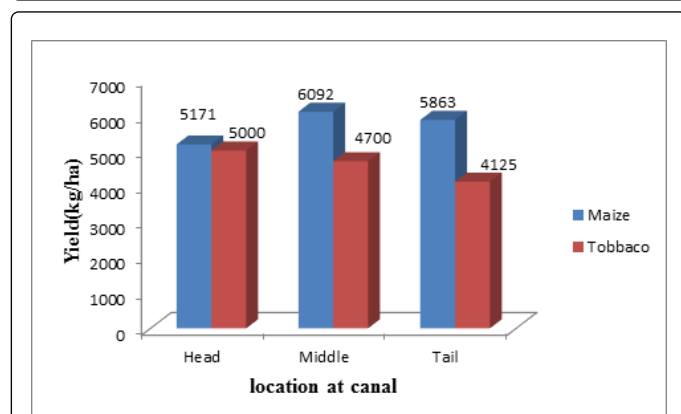


Figure 6: Crops yield for Kharif Season.

Number of irrigations

Number of irrigations was about same at head, middle and tail of the canal because farmers followed pakka warabandi system. The average number of irrigations were 5 for wheat, 7 for maize, 22 for sugar cane and 8 for tobacco (Figure 7).

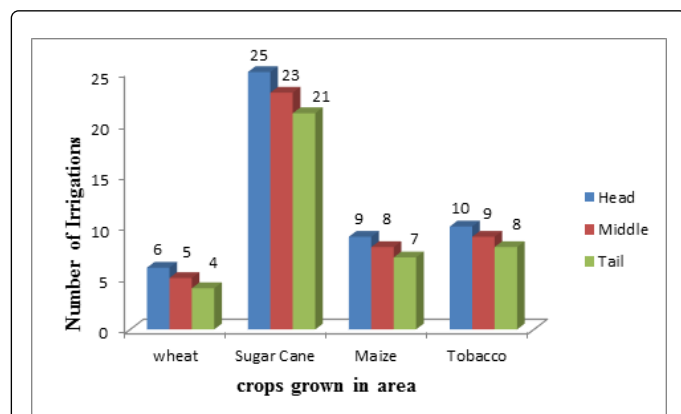


Figure 7: Numbers of Irrigations for Different Crops.

Agronomic practices

In agronomic practices mainly studied were related to yield improvement factors and agriculture production problems. These factors were studied at the head middle and tail of the canal. Most of the yield improvement factors which were pointed out by the farmers were common at the three selected sites of the canal. Some of these factors which improve yield were availability of enough water, insecticides, pesticides, fertilizers and low cost and high-quality seed varieties, lining of canals and watercourses, farmers education and awareness in farmers etc. The second point which was mainly focused was the agriculture production problems. The main agriculture production problems were silt deposition in canals and watercourses, lack of education in farmers, high cost and low-quality seeds, small land holding, insufficient water availability and subsidies etc [4,5].

Water management practices

In water management practices we focused on several factors which affect the yield of different crops in the command area. These factors were irrigation water sufficiency, water distribution at canal, canal maintenance, disputes over irrigation water and how these disputes were resolved.

1. The irrigation water was enough at the head of the canal and insufficient at the tail of the canal.
2. The water distribution on at the canal was Malia based.
3. The canal was cleaned once per year and no fund was collected for this purpose. Each farmer took his own part in canal cleaning.
4. The disputes over water were a major concern. Some farmers did not have disputes over irrigation water while others have disputes over water with other farmers.
5. The disputes over irrigation water are resolved through local Jirga.

Conclusions

1. The land holding per house hold was higher at the middle of the canal.
2. Most of the farmers of the command area were owner (56%).
3. Wheat was the major crop in Rabi season covering an area of 48% and yielded 4705 kg/ha.
4. Maize was the major crop in kharif season covering an area of 74% and yielded 5709 kg/ha.
5. Some of the factors which improve yield were availability of enough water, insecticides, pesticides, fertilizers and low cost and high-quality seed varieties, lining of canals and watercourses, farmers education and awareness in farmers etc.
6. The main agriculture production problems were silt deposition in canals and watercourses, lack of education in farmers, high cost and low-quality seeds, small land holding, insufficient water availability and subsidies etc.
7. The irrigation water was enough at the head of the canal and insufficient at the tail of the canal.
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9. The canal was cleaned once per year and no fund was collected for this purpose. Each farmer takes his own part in canal cleaning.

10. The disputes over water were a major concern. Some farmers did not have disputes over irrigation water while others have disputes over water with other farmers.
11. The disputes over irrigation water were resolved through local jirga.

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