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Research Article

Evaluation of Water Management Practices at Command Area of Gandigar Irrigation Scheme in District Dir Upper

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Abstract

The research study was conducted on the evaluation of Gandigar irrigation scheme in District Dir upper with the objectives, land holding, tenancy status, cropping pattern, irrigation practices and yield of major crops at head, middle and tail sections of the scheme. A detail Performa was designed and pre-tested to achieve the desired objectives. Results showed that the average farm size at head, middle and tail was 1.05 ha, 1.74 ha and 0.84 ha respectively, in which majority of the farmers 59 % were land owners while 22 % and 19 % were tenant and owner cum tenants. Wheat was the most dominant Rabi crop 50 %, at head and middle while 54 % at tail, While in Kharif season Maize was the dominant crop 37 %, 40 % and 61 % at head, middle and tail respectively. The number of irrigations in Rabi season for wheat crop at head ranged 4-7, at middle 3-6 and at tail section 2-5, whereas for Maize crop in Kharif ranged from 4-7 at head and middle and 3-6 at tail section. The maximum average yield in Rabi and Kharif season of wheat and Maize crop was observed at middle, while the minimum yield was at the tail section. Based on farmer's perceptions, 80 % respondents at head section, 53 % at middle and 27 % at tail section reported that water supply was adequate for their crops while the remaining disagreed. It is recommended that the farmers should be educated with the application of water and a detail study of irrigation scheduling of main crops are also needed.

Keywords: Cropping pattern; Gandigar irrigation scheme; Water management practices; Yield

Introduction

Water is the life line for the entire living organism present on this earth which is essential constituent of life, maintains the ecosystem, develops the biodiversity and accomplishes the human needs from washing to irrigation of crop. Agriculture output can be increased either by bringing additional land under plough or by increasing per hectare yield. Bringing cultivable waste land under plough involves heavy capital investments and a long period to achieve a proper balance in the production, while in view of current low yields their considerable potential for increasing the output per hectare. It has been realized through some recent research studies that one of the main cause of low agricultural output is the incompetent use of available Irrigation water Choudhry. Agriculture consumes 70% of available water, 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 suitable solution of the problem to control and utilize this water efficiently and judiciously, because of the rising demand for food, shelter and clothing by an ever-growing world population has led to over exploitation of scarce water resources.

The irrigation system in Pakistan is the largest continuous irrigation system in the world. The total irrigation area in Pakistan is 14.6 million hectares. It comprises the Indus and its main tributaries, three major strong reservoirs, nineteen barrages, forty primary system called commands and 89,000 water courses. The total length of canal is about 56,000 km with watercourses farm channels and ditches running another 1.6 million km in length. Despite of the widespread 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 worldwide agricultural production standards or in terms of its own potential. Along with this variation with in demand and supply, inequitable distribution, high water losses, siltation of canal and watercourses, maintenance are the serious problems. Another reason is our inadequate and inappropriate organizational structure, which appear to be the major constraints retarding the efforts to improve our irrigation system. In order to obtain optimum benefits from water develop for agriculture a better understanding and knowledge of water management practices at farmer's field level is necessary. The farmers must know how to manage irrigation on farm and how to prepare land for application of water and understand the water management practices. Therefore, a need was felt to carry out a study to find irrigation and agronomic practices, Crop yield, cropping pattern and tenancy status at head, middle and tail of the Gandigar irrigation scheme.

Materials and Methods

Description of study area

The study was conducted in district Dir upper on Gandigar irrigation scheme in the year 2012.The area is located at the middle of Dir upper. The scheme was named after the village it irrigates. It takes off at Almas headwork from Usheri River, which is tributary of river Punjkora. The total length of canal is 28 km (RD=92000ft) and has a design discharge of 2.40 cumecs, Gross command area of the canal is 922 hec and culturable command area is 814 ha with total 101 outlets. The canal irrigates villages of Almas jabar, Tangai and KattanBala with a total area of 100 ha at head section, Katanpayeen and Gandigar with a total area of 510 ha at middle section and Manobanda, Bebiyawar and Ounkar with a total area of 204 ha at tail section. The canal flows 10 months of the year and remain closed from the mid of December to end of February. (Irrigation department).

Different water management practices were studied at head, middle and tail outlets. The outlets command areas were 18 ha, 34 ha and 25 ha at the head, middle and tail respectively, while their design discharges were 0.02, 0.05 and 0.03 cumecs (0.74, 1.85and 1.21 cusecs) respectively. According to Irrigation department soil of the area varies from location to location and even within a location. Topography rang from steeply slope to gentle and flat land, So Terraces are formed for Proper irrigation and other agriculture practices.

Conducting interviews

Questionnaire Performa was developed to get information related to water Management practices from the farmers. Total 45 farmers were interviewed at head, middle and tail section of the command area of canal. At each section 15 farmer were interviewed.

Farmers were asked about their education, tenancy status, land holding, Cropping pattern, yield of major crops and irrigation practices. Besides, Information was collected about water distribution and of turns. Farmer's point of views about exchange of water irrigation at night, de-siltation and maintenance of water was also recorded. Information regarding, how much area they can irrigate in one turn, and irrigation interval was obtained the same manner. The farmers were also discussed the major constrains with regard to canal water Supply and important water issue. Their problems and suggested solutions were recorded.

Data analysis

The data collected through questionnaire were systematically analyzed after survey was completed. Computer excel spread sheet were used for this purpose. The comparison of collected data of three section head, middle and tail was in focus. Qualitative data was presented in table, chart and graphs.

Results and Discussions

In this chapter result related to socioeconomic status, cropping pattern, irrigation practices and farmer perception about water management practices are presented and discussed.

Land Holding and Tenancy Status

(Figure 1) shows that he farms size at head section ranged from 0.40 ha to 2.02 ha with an average value of 1.05 ha, in the middle section 0.61 ha to 5.06 ha with an average value of 1.74 ha while in the tail section ranged from 0.20 ha to 3.64 ha with an average value of 0.84 ha for each farmer. (Figure 2) shows that the majority of the farmers 59(%) were land owner, 22(%) were tenants and 19% were owner cum tenant. Most of the farmers were land owners, because they were the residents of that area and their homes were also near to the fields.

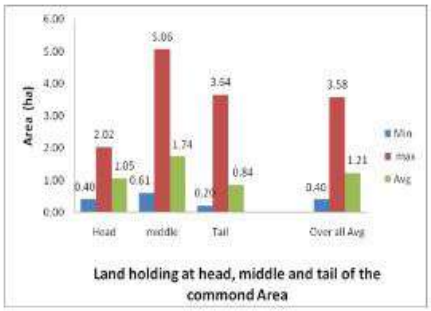

Figure 1: Land holding at head, middle and tail.

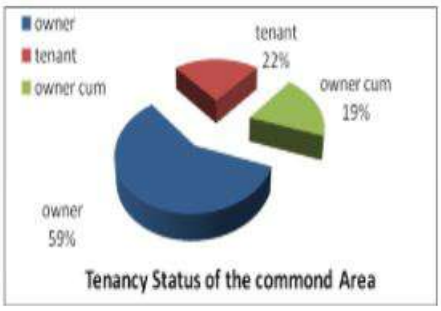

Figure 2: Tenancy status of the command area.

Socio-economic survey

A detailed questionnaire performs was developed to assess the socio-economic status of the farmer at the project site during summer 2012. Forty-five farmers of the study area were interviewed to collect the data on social, education and economic status of farmers. According to the general survey most of the farmers were illiterate, poor and have small land holding. Majority of the population depends on Agriculture and livestock. (Figure 3) shows that Agriculture was the source of income for 56% people of the command area. Most of the people had income from Agriculture because of the Irrigation scheme. (Figure 4) shows the educational status of the farmers in Gandigar irrigation scheme area which reveals that the majority of the people 36% were illiterate. The high illiteracy rate is due to the sole reason that the area is far away from the settled areas and the people are poor and cannot afford the education expenses.

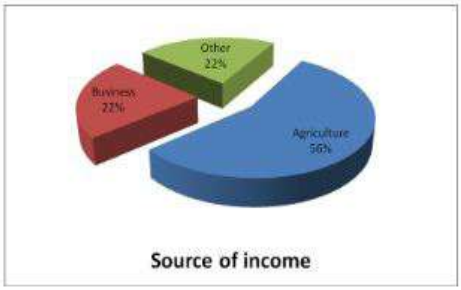

Figure 3: Source of income.

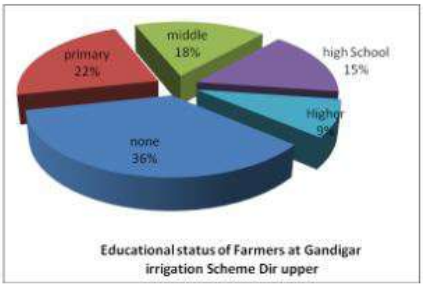

Figure 4: Educational status of farmers at Gandigar irrigation scheme.

Cropping pattern

Cropping pattern in winter (Rabi) season

Major Rabi crop in the entire command area of Gandigar irrigation scheme were wheat 51%, onion 27%, fodder 3%, Orchard 3% and other 8% (mustard, pea, turnip, garlic, coriander). Only 6% of the area was fallow during the winter (Rabi) season. Major crops in winter at head was Wheat 50% followed by Onion 27%, while at middle and tail was Wheat 50% and 54% respectively. (Figure 5) shows that Wheat was most dominant crop during Rabi season this is because wheat is the staple diet of the people in the command area. The fallow land is increasing from head to tail and this is due to the reason that water decreases while reaching to the tail or end of the command area. There is no enough water available for the irrigation of the entire land, this is why Onion is grown in a very little amount.

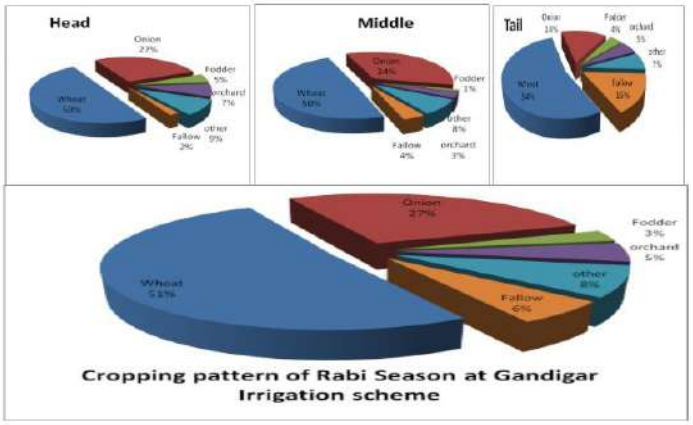

Figure 5: Cropping pattern of Rabi season at Gandigar irrigation scheme.

Cropping pattern in summer (Kharif) season

Major Kharif crops in the command area of Gandigar Irrigation Scheme were maize 44%, Rice 14%, potato 10%, tomato 9%, Orchard 5%, fodder 3% and vegetable 9%. Only 6% of the area was fallow during the summer (Kharif) season. Cropping pattern changes from head to tail because of the availability of water and soil type. At head the major crop was Maize 37% followed

by Potato 34%, at middle 40% followed by Rice 30% and at tail 61% followed by vegetables 9%. Figure of the head, middle and tail shows that the fallow land increased from head to tail this is because of the water availability, at head only 2% land was fallow while at the tail 14% was fallow which is 7 times of the head region. Besides, the production of other crops has also been decreased (Figure 6).

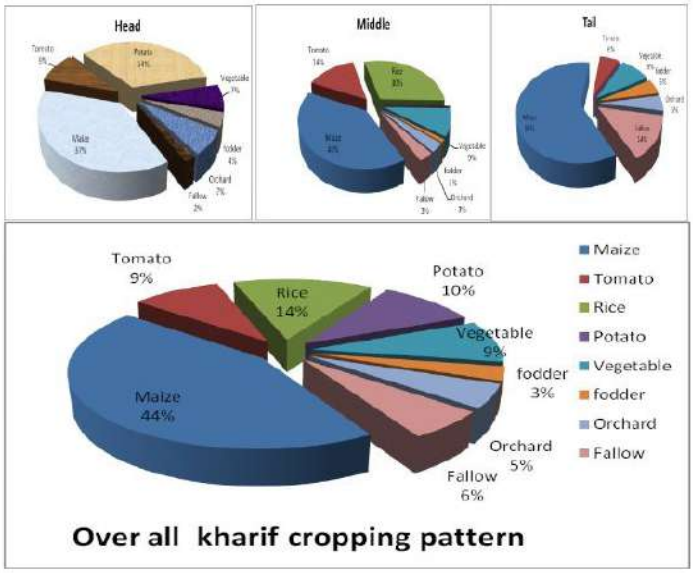

Figure 6: Over all Kharif cropping pattern.

Irrigation practice

Irrigation interval

The number of irrigations for wheat crop at head ranged from 4-7; however, majority of the farmers practiced 6 Irrigations. At middle ranged from 3-6 Irrigations, while in tail ranged from 2-5 irrigations in the entire season. Whereas, for maize the Number of irrigations ranged from 4-7 at head and middle sections and 3-6 at tail section. (Figure 7 and 8) shows number of irrigations of Rabi and Kharif seasons at head, middle and tail command areas.

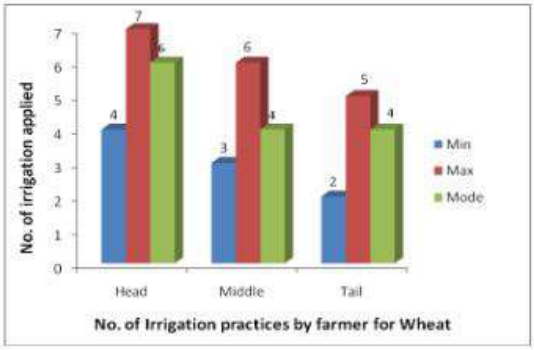

Figure 7: No of Irrigation practices for Wheat.

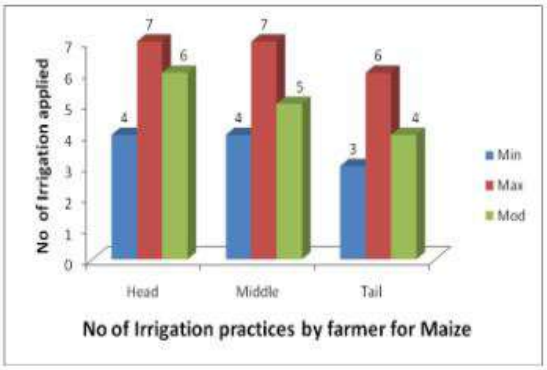

Figure 8: No of Irrigation practices by farmers for Maize.

Irrigation Methods

Since water availability is not limited so surface irrigation is practiced throughout the entire canal command area. Farmers irrigate different crops at different methods. Wheat, Rice and Mustard are grown at border irrigation method. Maize, Wheat, onion and garlic are grown in basin. Potato and pea are grown in furrow irrigation method as shown in (Table 1)

Statement	Farmer agreeing % Respondent in "yes"		
	Head	Middle	Tail
The supply of water is adequate.	80	53	27
Fluctuation of water from turn to turn.	4	80	93
There are conflicts over water.	53	60	53
Irrigation at night time	0	80	93
Difference between day night water			
Availability.	0	67	100
Take part in water course\canal cleaning			
Or maintenance	53	93	67
Farmers are willing to reschedule irrigation.	27	40	60

Table 1: Farmer perceptions about water management practices.

Yield of the Major crops in the command area

It is obvious from the (Figure 9 and 10) that crop yield increase from head to middle and decline again to tail section. The average yield of wheat is 1858 kg/ha at head section 2154 at middle section and 1414 at tail section. The average yield of maize is 3161 kg/ha at head, 3346 kg/ha at middle, and 2281 kg/ha. At tail section Rice is growing only in middle section and its average yield is 3052 kg/ha. Soil type of head section is not suitable for rice. The average yield of onion is 20610kg/ha at middle and 15084 kg/ha at tail section. Potato is grown only in head section and its average

yield is 12103 kg/ha.

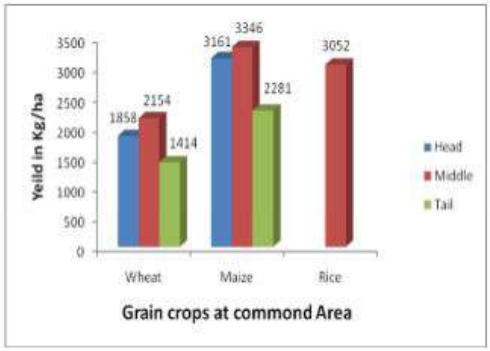

Figure 9: Grain crops at command area.

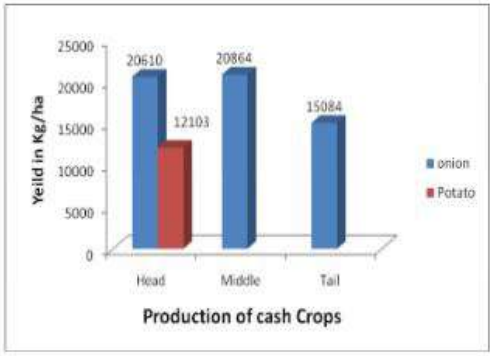

Figure 10: Production of cash crops.

Farmer perception about management practices

Based on farmer perception 80% of respondent at head section, 53% at middle and 27% respondent at tail section reported that water supply is adequate for their crops. While the remaining showed their dissatisfaction. The following table 4.2 shows that water fluctuation from turn to turn are high at tail section,(93%) and middle section (80%) as compared to head section (4%).conflicts were more at middle (60%) section as compared to head (53%) and tail (53%) section.

Irrigation at night was not practiced at head section because irrigation authorities close the outlets at night time, while majority of farmer practiced irrigation at night at middle and tail section. At head section farmers did not perceived any difference between day and night water availability. While in tail section 100% farmer take reported difference between day and night availability. At head section 53% farmer take part in the watercourse and canal cleaning and maintenance activates in middle 93% and at tail 67% of farmer take part in water courses cleaning and maintenance activities.

At head section a few farmers were agreeing to reschedule water distribution system. While at middle and tail 40% and 60% farmer were agreeing to reschedule system.

Conclusions and Recommendation

It is concluded from the above results and discussion that the average farm size at head, middle and tail was 1.05 ha, 1.74 ha and 0.84 ha respectively., in which majority of the farmers 59 % were land owners while 22% and 19% were tenant and owner cum tenants. Majority of them were illiterate, poor and were dependent on Agriculture. Wheat was the most dominant Rabi crop 50%, 50% and 54%, followed by onion 27%,34% and 14% at head, middle and tail sections correspondingly. While in Kharif season Maize was the dominant crop 37%, 40% and 61% at head, middle and tail, followed by Potato 34%, tomato 14 % and vegetables 9% at head, middle and tail sections respectively. The number of irrigations in Rabi season for wheat crop at head ranged 4-7, at middle 3-6 and at tail section 2-5, whereas for Maize crop in Kharif season number of irrigations ranged from 4-7 at head and middle and 3-6 at tail section. Due to the plenty of water, surface irrigation is practiced throughout the canal command area. The maximum average yield in Rabi and Kharif season of wheat and Maize crop was observed at middle, while the minimum yield was at the tail section. Based on farmers perceptions 80% respondents at head section, 53% at middle and 27% at tail section reported that water supply was adequate for their crops while the remaining disagreed. The conflicts between the farmers were more at middle than head and tail sections of the irrigation scheme in the study area. On the basis of conclusions, it is recommended that the farmers in the entire scheme need awareness with regard to the water application and irrigation scheduling study of main crops are also needed so that the farmers my understand when to irrigate and how much water to apply to their crops.

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