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CORRELATION OF UNIT DRAFT OF ELECTRIC TUBEWELLS AND IRRIGATION REQUIREMENTS OF CROPS IN SELECTED AREAS OF PUNJAB-A CASE STUDY

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ABSTRACT

There are about 0.5 million private shallow electric tubewells in Punjab State. The farmers are charged by a flat rate for consumption of electricity by agricultural pumpsets.There is tendency among the farmers to operate the tubewells for the period the electricity is available to them especially in kharif period. The annual unit draft of electric tubewell varies in canal and tubewell irrigated areas mainly depending upon cropping pattern, size of holding etc. In the present paper, correlation of unit draft of electric tubewell and irrigation requirements of crops in the land holding has been made on the basis of case studies carried out in six blocks of the state. It is concluded that there is an excess withdrawal of groundwater from electric tubewells than the optimum amount of irrigation water required for raising crops. So there is need to educate the farmers to avoid excessive application of tubewell water to conserve the precious groundwater resource.

INTRODUCTION

Irrigation water plays a key role in the agricultural production of the state. The distribution and amount of rainfall is such that is not possible to get higher yields of crops under rainfed conditions. For getting higher production of crops it is very important that the crops receive optimum amount of water either through irrigation or rainfall. The Punjab State has net cultivated area of 4.21 million hectares and about 85 percent of it receives irrigation water mainly through canals network and private shallow tubewells.

There are more than 7 lakh shallow private shallow tubewells in the state and out of which about 5 lakh shallow tubewells are electrically operated. The farmers are being charged at flat rate of Rs.12.14/BHP/month with effect from September, 1986 for consumption of electricity by their tubewells. There is tendency among the farmers to operate the tubewells for period the electricity is available especially in kharif period. The present case study of correlation of seasonal/annual irrigation requirements of crops and annual/seasonal draft of electric tubewells has been taken up to know whether the pumpage from electric tubewells is according the optimum irrigation requirements of crops in the command area of electric tubewell or there is excessive withdrawal of groundwater by the farmers. Water meters and hour meters were installed by Groundwater Cell on selected

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electric tubewells in Banga block of Jalandhar Distt, Garhshanker block of Hoshiarpur distt, Rayya block of Amritsar distt, Dhariwal block of Gurdaspur distt, and Nurpur Bedi block of Ropar distt. In addition data of energy meters installed in PSEB in Kapurthala block of Kapurthala distt. has also been used for correlation purposes.

IRRIGATION REQUIREMENTS OF CROPS

The irrigation requirements of crops in an area mainly depends upon cropping pattern, rainfall, size of land holding, texture of soil and water table depth. In the areas under study the main crops sown in Rabi season are wheat, oilseed, fodder and vegetables etc and in Kharif season paddy, sugarcane, cotton, maize, fooder and vegetables etc. are sown. Punjab Agricultural University, Ludhiana has worked out the irrigation requirements for optimising crop production in Punjab and is given in Table-I. These irrigation requirements are at field site and do not include conveyance losses from source of the site.

In the present study the total irrigation requirement of crops at the source have been worked out taking into account the irrigated area under a crop, irrigation requirements and efficiency factor (Table-II). As the total irrigation requirements also depend upon command area, the total irrigation requirements have been worked out for one hectare area of convenience in present study. The efficiency factor has been taken as 1.15 to work out total amount of irrigation water required at the source i.e. at electric tubewell. It has been worked out that the irrigation requirements during kharif season in all the blocks under study, vary from 1.18 ham to 1.25 ham per hectare. The irrigation requirements during Rabi season in the blocks under study varies from about 0.49 ham to 0.60 ham.

UNIT DRAFT OF ELECTRIC TUBEWELLS

For the study of unit draft of electric tubewells data collected from water meters and hour meters fitted on selected electric tubewells in Rayya, Dhariwal, Banga, Garhshanker and Nurpur Bedi blocks have been used. The number of cases studied in each block is given in Table-II. Both water meters and hour meters were fitted for one hydrological year. Besides the data of energy meters fitted by Punjab State Electricity Board in Kapurthala block was used for working out seasonal and annual unit draft of electric tubewells. The study shows that unit draft of electric tubewell in Kapurthala, Rayya, Dhariwal and Banga blocks varies from 2.02 ham to 2.37 ham whereas in Garshanker and Nurpur Bedi block, it varies 1.84 ham to 1.89 ham.

ANALYSIS AND CONCLUSIONS

The correlation of data of seasonal unit draft of electric tubewells per hectare with the seasonal irrigation requirements of crops per hectare shows that during kharif season, unit draft of electric tubewells in Kapurthala, Rayya and Banga Blocks is

Table I - Irrigation Requirements of Various Crops Grown in Punjab
(Source PAU)

Kharif Crop	Irrigation Requirements cm.	Rabi Crops	Irrigation Requirements cm.
Paddy	180	Wheat	45
Sugarcane	150	Rabi Fodder	100
Cotton	45	Barley	25
Fodder	30	Gram	25
Bajra	15	Mustrad	25
Maize	40	Peas and Lentil	25
Groundnut	25	Vegetable	60
Arhar	25	Potato	60
Other Pulses	20	Fruits	100

Table II - Correlation of Irrigation Requirements and Seasonal/Annual Draft of Electric Tubewells

Sr. No.	Name of the block/Distt.		Method Used	No. of cases	Draft of electric tubewells per Hect.		Total Annual Draft	Irrigation Requirement per hect.		Total irrigation Requirements
					Kharif Season (ham)	Rabi Season (ham)	(ham)	Kharif Season (ham)	Rabi Season (ham)	(ham)
1.	Kapurthala block	Kapurthala	Energy meter	37	1.43	0.94	2.37	1.24	0.56	1.80
2.	Rayya block	Amritsar	Water meter	5	1.54	0.69	2.23	1.25	0.53	1.78
3.	Dhariwal block	Gurdaspur	-do-	11	1.29	0.73	2.02	1.23	0.60	1.83
4.	Banga block	Jalandhar	-do-	10	1.42	0.74	2.16	1.25	0.57	1.82
5.	Garhshanker block	Hoshiarpur	Hour meter	11	0.91	0.98	1.89	1.19	0.54	1.73
6.	Nurpur Bedi block	Ropar	-do-	10	0.96	0.88	1.84	1.18	0.49	1.67

about 14% to 23% is more than irrigation requirements of crops during Kharif season. In the above said study areas, there is no canal irrigation. In Dhariwal block which is also canal irrigated area, the unit draft of electric tubewells in Kharif season is about 5% more than the irrigation requirements. In this area the draft is more than irrigation requirement even though canal water is also available in weekly basis. In Garhshanker and Nurpur Bedi blocks, the pumpage by electric tubewells during Kharif season is about 23% to 30% less than the irrigation requirement of crops. As these areas fall in Kandi tract of the State, the discharge of tubewells is less but the rainfall in this area is more than plain areas of the State. In Rabi season the unit draft of electric tubewells is about 18% to 30% more than irrigation requirements of crops except in Kapurthala block where it on higher side due to sandy soils. An overall allowance of above 15% of total units consumed in Rabi season may be kept for thrashing operations on electric motors and for other domestic purposes. It is concluded that there is an excessive withdrawal varying from 3% to 15% by electric tubewells in one or both the seasons in blocks of Kapurthala Raya, Dhariwal and Banga blocks. Taking into account the total number of 0.5 million electric tubewells in Punjab, it is concluded there is tremendous amount of wastage of groundwater resources and electricity in Punjab. It is recommended that suitable measures should be taken to check the wastage this precious natural resources and electricity.