



Economic study of blackgram - Indian mustard cropping system under different rain water conservation practices

Abstract

An experiment was conducted during two consecutive years of 2015-2016 and 2016-2017 at Hillocks and Valley Watershed of Jhararghat, Lalitpur, situated in catchments area of river Betawa. The soil of watershed area was sandy loam locally known as Rakar, having pH 8.1, organic carbon 0.26%, total nitrogen 0.02%, available phosphorous 10.38 kg/ha and available potassium 227.00 kg/ha initially before starting of present experiment. The trial was conducted on farmers fields under blackgram-Indian mustard cropping system. There were four treatments comprised of conventional system, runoff recharge in stony dug wells, runoff harvesting at hill bottom in natural water impounding structure and runoff collection in constructed water storage structure. The black gram variety Azad Urd-3 and Indian mustard Ev.Varuna were sown with conservation agronomical practices. The highest seed yield of blackgram by 9.06 q/ha was reaped from runoff collection in constructed water storage structure of pilot area. The sowing of Indian mustard after blackgram in the same treatment gave highest seed yield by 24.87 q/ha. The net return was found maximum Rs. 120675/ha with runoff collection in constructed water storage structure. There was different of Rs 68480 /ha was noted between runoff collection in constructed water storage structure and conventional system. Runoff collection in constructed water storage structure brought out the maximum benefit cost ratio of 1:3.20. The lowest benefit cost ratio of 1:1.95 was computed under conventional system or farmers practice.

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B:C ratio, Cropping system, Economic study, Net return, Rain water conservation

Introduction

The rain water is the most valuable natural resource. It play a decisive role in agriculture production. Water needs of crops are greatly influenced by the factor, such as, evaporative, soil - water regime in the root zone, and the nature and the extent of plant foliage. A crop well supplied with water grow luxuriantly and makes more efficient use of available plant nutrients in soil and those applied through fertilizers.

The soil moisture level influence the depth and volume of crop roots, and a well developed root system would be more effective in absorbing plant nutrients as compared to roots developed sparsely. Thus, it is highly imperative to maximize the utilization efficiency of irrigation and fertilizers, the two vital but limited and costly inputs in agricultural production.

The water management has still greater relevance in the food hill and valley areas in Bundelkhand region, most part of which remains seasonally dry in respect of crop production in spite of having high rainfall. Owing to the peculiar agro-climate and topographical conditions in these areas, the rain water management

technique would naturally be quite different and specific as compared to those in the plains.

In hill and valley area of Bundelkhand (U.P.), generally mono cropping is in practice in the depressions. For changing the pattern of mono cropping in double cropping and to accelerate the productivity and profitability of blackgram and Indian mustard through double cropping system of blackgram-Indian mustard, the present study was conducted, which is subject matter of this manuscript.

Materials and Methods

The study was under taken during two consecutive years of 2015-16 and 2016-17 at Jhararghat hillock watershed of Lalitpur district of Bundelkhand under rainfed situation. The operational area of watershed typically represent soil, climate and socio-economic condition of Bundelkhand Region. The soil of watershed was Rakhar, having pH 8.1, organic carbon 0.26%, total nitrogen 0.02%, available phosphorus 10.38 kg/ha and available potash 227.00 kg/ha, therefore, the fertility status was poor. The pH determined by Electrometric glass electrode method (Piper, 1950), while organic carbon was determined by Colorimetric method (Datta *et al.*, 1962),

Table-1: Statement Showing yield, cost and return of blackgram – Indian mustard cropping system under different rain water conservation practices (pooled data of two years)

Treatment	Yield (q/ha) cost of			Gross return (RS/ha)	Net return (Rs/ha)	BCR
	Black gram	Indian Mustard	Cultivation (RS/ha)			
T ₁ conventional System (CS)	6.31	13.93	54660	106855	52195	1:1.95
T ₂ Runoff recharge in Stony dug wells (RRSW)	7.56	18.93	54660	138105	83445	1:2.52
T ₃ Runoff harvesting at hill bottom in natural water impounding Structure (NWIS)	8.81	23.00	54660	165170	110510	1:3.02
T ₄ Runoff collection in constructed water storage structure (CWSS)	9.06	24.87	54660	175335	120675	1:3.20
S.E. (m [±])	0.16	0.43	-	956.64	194.02	0.08
C. D. 5%	0.45	1.22	-	2814.01	570.72	0.23

total nitrogen was analysed by Kjendahl's method as discussed by Piper (1950). The available phosphorus and potash were determined by Olsen's method (Olsen *et al.*, 1954) and Flame photometer method (Singh, 1971), respectively. The blackgram-Indian mustard cropping system was tested under four rain water management practices i.e., conventional system (C.S.), runoff recharge in stony dug wells (RRSW), runoff harvesting at hill bottom in natural water impounding structure (NWIS) and runoff collection in constructed water storage structure (CWSS). The blackgram was sown between 10-15 July on conserved moisture and harvested between 10-15 October during both the experimental years. After harvesting of blackgram between the Indian mustard was seeded between 20 – 25 October and harvested between 20-25 February in both the years of study. The conservation agronomical practices were followed for raising of crops. The one protective irrigation was given to blackgram between puddling and pod filling stage. Three protective irrigations were given at 30, 60 and 90 days of seeding to Indian mustard. The analysis of yield and economics were done by standard method as developed by Cocharan and Cox (1963).

Results and Discussion

The experimental findings as influenced by different treatments are discussed on the basis of pooled year results, given in Table-1.

Seed yield of blackgram (q/ha): Runoff collection in constructed water storage structure (T₄) of rain water management practice gave highest grain yield (9.06 q/ha), which was significantly superior than the T₁ (6.31 q/ha) and T₂ (7.56 q/ha) treatment but significantly at par with T₃ (8.81 q/ha). The increase in seed yield of blackgram may be attributed to the considerable increase in numbers of pots/plant, weight of seed/plant and weight of 100- seed. Similar results have also been reported by Singh (2009), Singh (2011), Singh (2013) and Singh (2015).

Seed yield of India mustard (q/ha): The seed yield of Indian mustard recorded maximum under T₄ method of moisture management (24.87 q/ha) in comparison to other tested treatments. The increase in seed yield may be attributed to the considerable

increase weight of seeds/plant and weight of 1000-seed. Similar results have also been reported by Rathi *et al.* (1978), Singh (2009), Singh (2011), Singh (2013) and Singh (2015).

Economic study; The total gross income was found highest (Rs. 175335/ha) with T₄ (runoff collection in constructed water storage structure – CWSS) followed in order of T₃, T₂ and T₁ in blackgram-Indian mustard cropping System. There was difference of Rs. 68480/ha between T₄ and T₁ (Conventional system/farmers practices). The net return was found maximum (Rs. 120675/ha) with T₄ (runoff collection in constructed water storage structure) followed in order of T₃, T₂, and T₁ under blackgram-Indian mustard cropping system. Runoff collection in constructed water storage structure brought out the maximum benefit cost ratio of 1: 3 :2 while lowest benefit cost ratio of 1:1.95 was recorded under conventional system.

The farm families residing in dry farm area of Uttar Pradesh may be advocated for adoption of double Cropping of blackgram-Indian mustard instead of monocropping of monoculture for obtaining better profitability.

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