Evaluation On Sustainable Agricultural Development With Special Reference To Chopra Tehsil, Uttar Dinajpur District, West Bengal

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ABSTRACT:

The application of farming techniques and practices that preserve or improve the natural resource base, other ecosystems that are impacted by agricultural activity, and the economic viability of agricultural production is known as sustainable agriculture. When agriculture is founded on a comprehensive scientific approach and is economically, socially, and culturally acceptable, it is sustainable. The management and preservation of the natural resource base, along with the direction of institutional and technical progress, constitute sustainable development. These actions guarantee the fulfilment of human needs for both current and future generations. In this article; evaluation on sustainable agricultural development with special reference to Chopra tehsil, Uttar Dinajpur district, West Bengal has been discussed.

Keywords: Sustainable, Agricultural, Development, Chopra, Uttar Dinajpur.

INTRODUCTION:

Agriculture is reliant on its natural surroundings. Rainfall is necessary to investigate the possibility of using surface and groundwater resources, which is the only way to conserve water. [1] The source of high-quality water for irrigation in the agricultural sector is drainage. The amount of water available for different crops cultivated in varied climates determines how intensely an irrigation system should be used. [2-4] Agriculture and the physical atmosphere are inextricably linked, changes in the atmosphere will

inevitably affect how agricultural land is used. [5-6] It has long been recognised that changes in temperature have an indirect impact on how agricultural land is used; gradients in the slope, however, restrict agriculture and cause partially indirect variations in soil and climate on different slope faces. [7]

RESEARCH METHODOLOGY:

Study Area: Chopra Tehsil, Uttar Dinajpur, West Bengal, India.

Hypothesis (H_1): Sustainable agricultural development influences farmers and their families.

Research Design: In this research, descriptive research design has been used.

Sampling Plan: In this research, random sampling method has been used.

Sample Size: The sampling size was 300 respondents.

Methodology:

The researcher visited the tehsil and collected samples from agriculturally-related farmers and their families. Primary data was collected from farmers and their families related to agriculture by circulating questionnaires, statements followed by 5 point likert scale (Strongly Agree-5, Agree-4, Neutral-3, Disagree- 2, Strongly Disagree-1).

Research Tools: In this research, questionnaires & statements (5 point likert scale) has been used.

DATA ANALYSIS, RESULTS AND DISCUSSION:

Age group of the respondents:

Table 1. Age group of the respondents:

Types	**No of Respondents**	**Percentage**
Upto 40 years old	108	36
41-50 years	123	41
51 years and more years old	69	23

From the above table, the percentage of the 'Upto 40 years old' age group was 36%, '41-50 years' old respondents were 41% and 51 years and more years old' were 23%.

Educational qualifications of the respondents:

Table 2. Educational Qualifications of the respondents:

Levels	**No of Respondents**	**Percentage**
Primary level	168	56
Secondary level	63	21
Higher secondary/Diploma level	39	13
Graduation level	18	6
More than graduation level	12	4

From the above table, the percentage of the primary level was 56%, secondary level was 21%, higher secondary/diploma level was 13%, graduation level was 6% and more than graduation level was 4%.

Gender of the respondents:

Table 3. Gender of the respondents:

Levels	**No of Respondents**	**Percentage**
Male	258	86
Female	42	14

From the above table, the percentage of the males was 86% and percentage of the females was 14%.

Farmers with holdings within the size classes:

Table 4. Farmers with holdings within the size classes:

Sizes	**No of Respondents**	**Percentage**
Upto 7 ha	189	63
Above 7 ha to 14 ha	75	25
Above 14 ha and more	36	12

From the above table, the sizes 'upto 7 ha' was 63%, 'Above 7 ha to 14 ha' was 25% and 'above 14 ha and more' was 12%.

Preservation of soil fertility:

Preservation of soil fertility	**No of Respondents**	**Percentage**
Fertilization (Chemicals, animal manure, green manure etc)	81	27
Crop rotation (Cultivation of a series of dissimilar types of crops in the same area in sequential seasons)	99	33
Intercropping (Cultivation of two or more dissimilar types of crops in the same area in the same season)	75	25
Others (Please specify)	45	15

From the above table, the percentage of 'Fertilization (chemicals, animal manure, green manure etc)' was 27%, 'Crop rotation (cultivation of a series of dissimilar types of crops in the same area in sequential seasons)' was 33%, 'Intercropping (Cultivation of two or more dissimilar types of crops in the same area in the same season)' was 25%, and others were 15%.

Type of Fertilisers Applied:

Table 6. Type of fertilisers applied:

Types	No of Respondents	Percentage
Chemical fertilisers	126	42
Organic fertilisers	138	46
Others	36	12

From the above table, the percentage of 'chemical fertilizers' was 42%, 'organic fertilizers' was 46%, and others was 12%.

Control Pests and Diseases:

Table 7. Control pests and diseases:

Control pests and diseases	No of Respondents	Percentage
Biological & organic control methods (non-chemical control methods)	99	33
Integrated pest management (IPM) methods	63	21
Chemical pesticides (treatment), specify what do you use?	87	29
Other methods (specify)	51	17

From the above table, the percentage of 'biological & organic control methods (non-chemical control methods)' was 33%, 'integrated pest management (IPM) methods' was 21%, 'chemical pesticides (treatment),' was 29% and other methods (specify) was 17%.

Control Weeds:

8. Control Weeds:

Control weeds	No of Respondents	Percentage
By burning plant residues after harvesting.	78	26

By grazing through animals.	93	31
By mechanical weeding	54	18
By crop rotation and/or intercropping	42	14
By chemical herbicides, specify what do you use?	33	11

From the above table, the percentage of 'by burning plant residues after harvesting' was 26%, 'by grazing through animals' was 31%, 'by mechanical weeding' was 18%, 'by crop rotation and/or intercropping' was 14% and 'by chemical herbicides' was 11%.

Statements towards Sustainable Agricultural Development:

(a) Environmental Balance:

Table 9. Environmental Balance:

Statement	**Options**	**No of Respondents**	**Percentage**
Environmental balance is one basis for sustainable agricultural practices.	Strongly Agree (5)	108	36
	Agree (4)	90	30
	Neutral (3)	12	4
	Disagree (2)	63	21
	Strongly Disagree (1)	27	9

From the above table, it was found that the percentage of 'Strongly Agree' was 36%, 'Agree' was 30%, 'Neutral' was 4%, 'Disagree' was 21%, and 'Strongly Disagree' was 9%.

(b) Advantage of sustainable agricultural practices:

Table 10. Advantage of sustainable agricultural practices:

Statement	**Options**	**No of Respondents**	**Percentage**

An advantage of sustainable agricultural practices is reduction in the use of chemical fertilizers.	Strongly Agree (5)	153	51
	Agree (4)	69	23
	Neutral (3)	48	16
	Disagree (2)	21	7
	Strongly Disagree (1)	9	3

From the above table, it was found that the percentage of 'Strongly Agree' was 51%, 'Agree' was 23%, 'Neutral' was 16%, 'Disagree' was 7%, and 'Strongly Disagree' was 3%.

(c) Farmers in sustainable agriculture:

Table 11. Farmers in sustainable agriculture lives more in harmony with nature:

Statement	Options	No of Respondents	Percentage
Farmers in sustainable agriculture lives more in harmony with nature	Strongly Agree (5)	144	48
	Agree (4)	36	12
	Neutral (3)	30	10
	Disagree (2)	54	18
	Strongly Disagree (1)	36	12

From the above table, it was found that the percentage of 'Strongly Agree' was 48%, 'Agree' was 12%, 'Neutral' was 10%, 'Disagree' was 18%, and 'Strongly Disagree' was 12%.

(d) Economic gains:

Table 12. Economic gains when employing sustainable agricultural practices are not convincing:

Statement	Options	No of Respondents	Percentage
Economic gains when	Strongly Agree (5)	48	16
	Agree (4)	42	14

employing sustainable agricultural practices are not convincing.	Neutral (3)	36	12
	Disagree (2)	108	36
	Strongly Disagree (1)	66	22

From the above table, it was found that the percentage of 'Strongly Agree' was 16%, 'Agree' was 14%, 'Neutral' was 12%, 'Disagree' was 36%, and 'Strongly Disagree' was 22%.

(e) Net farm income:

Table 13. Net farm income may decrease when a producer implements sustainable agricultural practices:

Statement	Options	No of Respondents	Percentage
Net farm income may decrease when a producer implements sustainable agricultural practices.	Strongly Agree (5)	54	18
	Agree (4)	63	21
	Neutral (3)	30	10
	Disagree (2)	84	28
	Strongly Disagree (1)	69	23

From the above table, it was found that the percentage of 'Strongly Agree' was 18%, 'Agree' was 21%, 'Neutral' was 10%, 'Disagree' was 28%, and 'Strongly Disagree' was 23%.

(f) Sustainable agricultural systems:

Table 14. Sustainable agricultural systems can improve income on a farm:

Statement	Options	No of Respondents	Percentage
Sustainable agricultural	Strongly Agree (5)	114	38
	Agree (4)	45	15

systems can improve income on a farm	Neutral (3)	48	16
	Disagree (2)	69	23
	Strongly Disagree (1)	24	8

From the above table, it was found that the percentage of 'Strongly Agree' was 38%, 'Agree' was 15%, 'Neutral' was 16%, 'Disagree' was 23%, and 'Strongly Disagree' was 8%.

(g) Sustainable agricultural practices:

Table 15. Sustainable agricultural practices would work well on any farm:

Statement	Options	No of Respondents	Percentage
Sustainable agricultural practices would work well on any farm	Strongly Agree (5)	213	71
	Agree (4)	27	9
	Neutral (3)	18	6
	Disagree (2)	12	4
	Strongly Disagree (1)	30	10

From the above table, it was found that the percentage of 'Strongly Agree' was 71%, 'Agree' was 9%, 'Neutral' was 6%, 'Disagree' was 4%, and 'Strongly Disagree' was 10%.

(h) Sustainable agricultural practices may require additional management beyond conventional practices:

Table 16. Sustainable agricultural practices may require additional management beyond conventional practices:

Statement	Options	No of Respondents	Percentage
Sustainable agricultural practices may require additional	Strongly Agree (5)	126	42
	Agree (4)	63	21
	Neutral (3)	42	14
	Disagree (2)	36	12

management beyond conventional practices	Strongly Disagree (1)	33	11

From the above table, it was found that the percentage of 'Strongly Agree' was 42%, 'Agree' was 21%, 'Neutral' was 14%, 'Disagree' was 12%, and 'Strongly Disagree' was 11%.

(i) The adoption of sustainable agricultural practices is slow because farmers lack the knowledge to implement them:

Table 17. The adoption of sustainable agricultural practices is slow because farmers lack the knowledge to implement them:

Statement	Options	No of Respondents	Percentage
The adoption of sustainable agricultural practices is slow because farmers lack the knowledge to implement them	Strongly Agree (5)	186	62
	Agree (4)	78	26
	Neutral (3)	15	5
	Disagree (2)	12	4
	Strongly Disagree (1)	9	3

From the above table, it was found that the percentage of 'Strongly Agree' was 62%, 'Agree' was 26%, 'Neutral' was 5%, 'Disagree' was 4%, and 'Strongly Disagree' was 3%.

(j) Recommended pest control methods for sustainable agricultural systems have potential for more pests in the long term:

Table 18. Recommended pest control methods for sustainable agricultural systems have potential for more pests in the long term:

Statement	Options	No of Respondents	Percentage

Recommended pest control methods for sustainable agricultural systems have potential for more pests in the long term	Strongly Agree (5)	144	48
	Agree (4)	48	16
	Neutral (3)	24	8
	Disagree (2)	57	19
	Strongly Disagree (1)	27	9

From the above table, it was found that the percentage of 'Strongly Agree' was 48%, 'Agree' was 16%, 'Neutral' was 8%, 'Disagree' was 19%, and 'Strongly Disagree' was 9%.

(k) Sustainable agricultural practices help protect the environment and our natural resources:

Table 19. Sustainable agricultural practices help protect the environment and our natural resources:

Statement	Options	No of Respondents	Percentage
Sustainable agricultural practices help protect the environment and our natural resources	Strongly Agree (5)	258	86
	Agree (4)	12	4
	Neutral (3)	3	1
	Disagree (2)	18	6
	Strongly Disagree (1)	9	3

From the above table, it was found that the percentage of 'Strongly Agree' was 86%, 'Agree' was 4%, 'Neutral' was 1%, 'Disagree' was 6%, and 'Strongly Disagree' was 3%.

(l) There may be insufficient labour for the workload required in sustainable agricultural system:

Table 20. There may be insufficient labour for the workload required in sustainable agricultural system:

Statement	Options	No of Respondents	Percentage
There may be insufficient labour for the workload required in sustainable agricultural system	Strongly Agree (5)	126	42
	Agree (4)	39	13
	Neutral (3)	48	16
	Disagree (2)	54	18
	Strongly Disagree (1)	33	11

From the above table, it was found that the percentage of 'Strongly Agree' was 42%, 'Agree' was 13%, 'Neutral' was 16%, 'Disagree' was 18%, and 'Strongly Disagree' was 11%.

(m) Sustainable agricultural systems should produce an adequate food supply to feel the world population:

Table 21. Sustainable agricultural systems should produce an adequate food supply to feel the world population:

Statement	Options	No of Respondents	Percentage
Sustainable agricultural systems should produce an adequate food supply to feel the world population	Strongly Agree (5)	234	78
	Agree (4)	36	12
	Neutral (3)	9	3
	Disagree (2)	15	5
	Strongly Disagree (1)	6	2

From the above table, it was found that the percentage of 'Strongly Agree' was 78%, 'Agree' was 12%, 'Neutral' was 3%, 'Disagree' was 5%, and 'Strongly Disagree' was 2%.

(n) Adoption of Sustainable agricultural practices will be easier for farmers who have both cropped and livestock Enterprises:

Table 22. Adoption of Sustainable agricultural practices will be easier for farmers who have both cropped and livestock Enterprises:

Statement	Options	No of Respondents	Percentage
Adoption of Sustainable agricultural practices will be easier for farmers who have both cropped and livestock Enterprises	Strongly Agree (5)	150	50
	Agree (4)	96	32
	Neutral (3)	27	9
	Disagree (2)	24	8
	Strongly Disagree (1)	3	1

From the above table, it was found that the percentage of 'Strongly Agree' was 50%, 'Agree' was 32%, 'Neutral' was 9%, 'Disagree' was 8%, and 'Strongly Disagree' was 1%.

(o) Make the most efficient use of nonrenewable resources and on-farm resources and integrate, where appropriate, natural biological cycles and controls:

Table 23. Make the most efficient use of nonrenewable resources and on-farm resources and integrate, where appropriate, natural biological cycles and controls:

Statement	Options	No of Respondents	Percentage
Make the most efficient use of nonrenewable resources and on-farm resources and	Strongly Agree (5)	138	46
	Agree (4)	84	28
	Neutral (3)	42	14
	Disagree (2)	24	8

integrate, where appropriate, natural biological cycles and controls	Strongly Disagree (1)	12	4

From the above table, it was found that the percentage of 'Strongly Agree' was 46%, 'Agree' was 28%, 'Neutral' was 14%, 'Disagree' was 8%, and 'Strongly Disagree' was 4%.

(p) Recommended practices in sustainable agriculture have been embraced by mainstream agriculture:

Table 24. Recommended practices in sustainable agriculture have been embraced by mainstream agriculture:

Statement	Options	No of Respondents	Percentage
Recommended practices in sustainable agriculture have been embraced by mainstream agriculture	Strongly Agree (5)	84	28
	Agree (4)	51	17
	Neutral (3)	48	16
	Disagree (2)	63	21
	Strongly Disagree (1)	54	18

From the above table, it was found that the percentage of 'Strongly Agree' was 28%, 'Agree' was 17%, 'Neutral' was 16%, 'Disagree' was 21%, and 'Strongly Disagree' was 18%.

(q) I would like to receive training in the use of sustainable agricultural practices:

Table 25. I would like to receive training in the use of sustainable agricultural practices:

Statement	Options	No of Respondents	Percentage

I would like to receive training in the use of sustainable agricultural practices	Strongly Agree (5)	135	45
	Agree (4)	90	30
	Neutral (3)	24	8
	Disagree (2)	36	12
	Strongly Disagree (1)	15	5

From the above table, it was found that the percentage of 'Strongly Agree' was 45%, 'Agree' was 30%, 'Neutral' was 8%, 'Disagree' was 12%, and 'Strongly Disagree' was 5%.

(r) The administration helps me to implement and use sustainable agricultural practices:

Table 26. The administration helps me to implement and use sustainable agricultural practices:

Statement	Options	No of Respondents	Percentage
The administration helps me to implement and use sustainable agricultural practices	Strongly Agree (5)	72	24
	Agree (4)	66	22
	Neutral (3)	18	6
	Disagree (2)	90	30
	Strongly Disagree (1)	54	18

From the above table, it was found that the percentage of 'Strongly Agree' was 24%, 'Agree' was 22%, 'Neutral' was 6%, 'Disagree' was 30%, and 'Strongly Disagree' was 18%.

(s) The biggest obstacle to implementing sustainable agricultural practices is my lack of knowledge and training:

Table 27. The biggest obstacle to implementing sustainable agricultural practices is my lack of knowledge and training:

Statement	Options	No of Respondents	Percentage
The biggest obstacle to implementing sustainable agricultural practices is my lack of knowledge and training	Strongly Agree (5)	36	12
	Agree (4)	99	33
	Neutral (3)	15	5
	Disagree (2)	72	24
	Strongly Disagree (1)	78	26

From the above table, it was found that the percentage of 'Strongly Agree' was 12%, 'Agree' was 33%, 'Neutral' was 5%, 'Disagree' was 24%, and 'Strongly Disagree' was 26%.

(t) I have a lack of training in sustainable agricultural practices:

Table 28. I have a lack of training in sustainable agricultural practices:

Statement	Options	No of Respondents	Percentage
I have a lack of training in sustainable agricultural practices	Strongly Agree (5)	57	19
	Agree (4)	24	8
	Neutral (3)	42	14
	Disagree (2)	126	42
	Strongly Disagree (1)	51	17

From the above table, it was found that the percentage of 'Strongly Agree' was 19%, 'Agree' was 8%, 'Neutral' was 14%, 'Disagree' was 42%, and 'Strongly Disagree' was 17%.

(u) More information on sustainable agricultural practices needs to be disseminated through farmer communities and cooperatives:

Table 29. More information on sustainable agricultural practices needs to be disseminated through farmer communities and cooperatives:

Statement	Options	No of Respondents	Percentage
More information on sustainable agricultural practices needs to be disseminated through farmer communities and cooperatives	Strongly Agree (5)	78	26
	Agree (4)	36	12
	Neutral (3)	63	21
	Disagree (2)	99	33
	Strongly Disagree (1)	24	8

From the above table, it was found that the percentage of 'Strongly Agree' was 26%, 'Agree' was 12%, 'Neutral' was 21%, 'Disagree' was 33%, and 'Strongly Disagree' was 8%.

(v) Sustainable agricultural practices promote a healthy environment:

Table 30. Sustainable agricultural practices promote a healthy environment:

Statement	Options	No of Respondents	Percentage
Sustainable agricultural practices promote a healthy environment	Strongly Agree (5)	207	69
	Agree (4)	33	11
	Neutral (3)	15	5
	Disagree (2)	36	12
	Strongly Disagree (1)	9	3

From the above table, it was found that the percentage of 'Strongly Agree' was 69%, 'Agree' was 11%, 'Neutral' was 5%, 'Disagree' was 12%, and 'Strongly Disagree' was 3%.

(w) Sustainable agricultural practices must be included as a condition for obtaining common agricultural policy:

Table 31. Sustainable agricultural practices must be included as a condition for obtaining common agricultural policy:

Statement	Options	No of Respondents	Percentage
Sustainable agricultural practices must be included as a condition for obtaining common agricultural policy	Strongly Agree (5)	123	41
	Agree (4)	33	11
	Neutral (3)	42	14
	Disagree (2)	57	19
	Strongly Disagree (1)	45	15

From the above table, it was found that the percentage of 'Strongly Agree' was 41%, 'Agree' was 11%, 'Neutral' was 14%, 'Disagree' was 19%, and 'Strongly Disagree' was 15%.

(x) I need more information about the long-term benefits and I will get from implementing sustainable agriculture practices:

Table 32. I need more information about the long-term benefits and I will get from implementing sustainable agriculture practices:

Statement	Options	No of Respondents	Percentage
I need more information about the long-	Strongly Agree (5)	108	36
	Agree (4)	48	16
	Neutral (3)	54	18

term benefits and I will get from implementing sustainable agriculture practices	Disagree (2)	63	21
	Strongly Disagree (1)	27	9

From the above table, it was found that the percentage of 'Strongly Agree' was 36%, 'Agree' was 16%, 'Neutral' was 18%, 'Disagree' was 21%, and 'Strongly Disagree' was 9%.

(y) The agricultural authorities encourage me to implement sustainable agricultural practices:

Table 33. The agricultural authorities encourage me to implement sustainable agricultural practices:

Statement	Options	No of Respondents	Percentage
The agricultural authorities encourage me to implement sustainable agricultural practices	Strongly Agree (5)	99	33
	Agree (4)	78	26
	Neutral (3)	57	19
	Disagree (2)	42	14
	Strongly Disagree (1)	24	8

From the above table, it was found that the percentage of 'Strongly Agree' was 33%, 'Agree' was 26%, 'Neutral' was 19%, 'Disagree' was 14%, and 'Strongly Disagree' was 8%.

CONCLUSION:

The effectiveness of a given package of sustainable agriculture varies depending on the following factors: the size of the base farm, the resources available, the growing environment (rain or irrigation), the urban or rural setting, the types of crops and businesses operating under the government's specific

macroeconomic policies, the dynamics of supply and demand, and societal customs. According to socioeconomic requirements, conducted extensive research on a variety of sustainability-related topics. The study's overall findings indicate that adopting systematic improvements in livestock and crop production as well as resource care can lead to higher levels of sustainability.

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