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Article : Contemporary Technology in Agriculture: An Assessment

Author : Tapas Pal [Visva Bharati, Santiniketan, West Bengal, India]

Abstract:
Agriculture is the base pavement, Industry is the roof and Technology is the pillar-architecture of any social development. From Vedic society, Indian agriculture was firmly adopting with traditional techno knowledge. Farmers were mainly eco-lover and to increase their agro-production in relevant of demand-supply ratio they were dependent on natural manure based organic elements. But in 2001 we have crossed 100 crores population's food demand. So, from upper politicians, scientists to lower peasants were thinking that how this food-crisis disaster can be checked?. All of them decided that we have to use chemical fertilizers, pesticides, insecticides instead of natural manure. Farmers are doing this in their agro-field and trying to increase the production rate. And the result outcome, the production has increased but these contemporary modern techniques are not fruitful and production for local environment for long-term effect and we are staying a risk associate vulnerable periphery. This paper encompasses over the use of modern technologies especially chemical fertilizers, pesticides & compost in agricultural development of Goalpara Village & its adverse effects as well as remedial measures.

Introduction:
Agriculture is the chief occupation of the people of this village, the best part of the working population being cultivators and agricultural labours. The principal crops that are included paddy, wheat, mustard seeds, pulses, potatoes, vegetables & sugarcane. Aush, Aman and Boro varieties of paddy are cultivated during high humidity & well distributed precipitation during the monsoon. The main purpose of the present study is to observe the impact of drastic evolutionary modern technologies according to different size classes of agricultural farms vis a vis the probable risk assessment associate with its application.

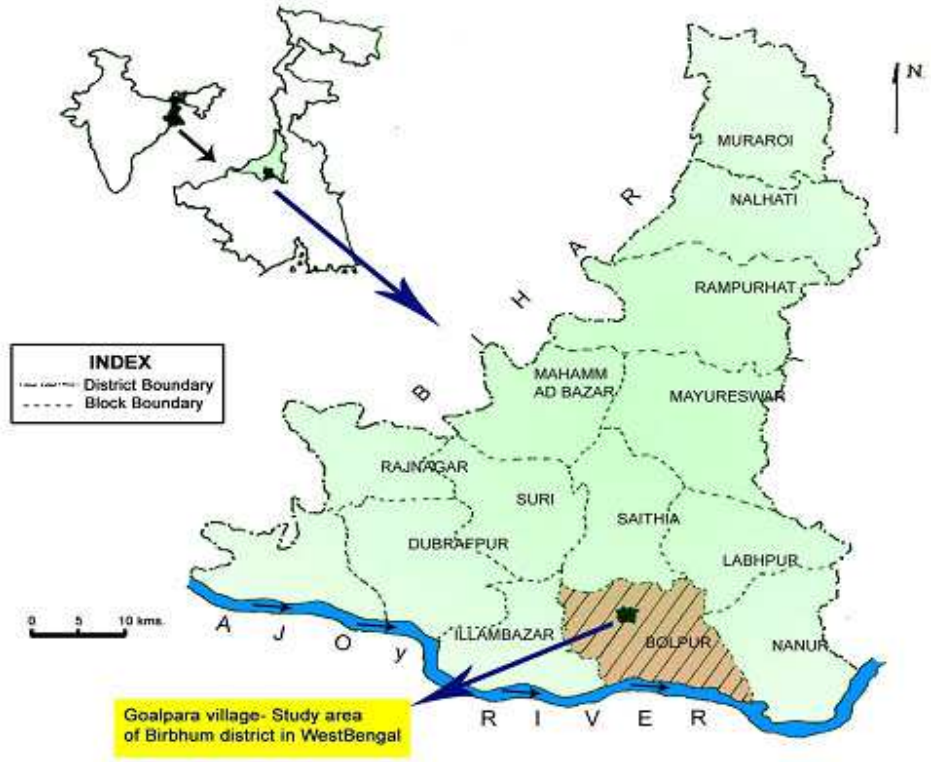
Objectives: The two main objectives of this study are as follows to examine the impact of contemporary modern technologies like-chemical fertilizers, pesticides & compost in agricultural production-landscape. Also to search the Risk associate vulnerable sphere this has linked with application of modern techniques

unscientifically. And lastly to suggest the policy measures for recovering the problems.

Data Base: Data have been collected from following sources i.e Primary source; indicates field analysis & interview to villagers based on the schedules of household and Secondary sources; diverse books & destination papers.

Methodology: The study is based on primary data, which includes farmer to farmer survey in this *Goalpara village*, personal interview & other convent sources due to complete non-availability of secondary data. Here random sampling technique has been applied due to large number of observation and for this 50 individual sample (farmer) have been selected with their personal view. During the post field stage author followed the zipping process to conclude the farmers' perception and experience to gather their viewpoint about use of modern contemporary technologies in agricultural field and related impact environment.

Location of study area: Bolpur subdivision is located at south border of Birbhum district with a total area of 1173.5 sq. kilometers. It extended from 23°32'30''to 23°53'00'' north latitude and 87°23'30''to 87°57'30''east longitudes. In the past it was a typical village. There were no rail, no developed roads. Paddy lands were seen around the village. "Lalmati"(red soil) were found everywhere. Many villages named Sian, Dihipara, Khosakdampur, Paruldanga, **Goalpara,** Ballavpur, Bandhgara, Surul, Supur, and Raipur were the boundary line around Bolpur. Goalpara is situated at basin area of River Kopai.



Production Scenario in Goalpara Village: With Contemporary Modern Techniques-

Table 1: Use of contemporary technologies (in kg) under Aus production according to different size classes of land building.

Range (in bigha)	***No. of households***	***Use of Chemical fertilizer /bigha (in kg.)***	***Use of pesticides/ Bigha (in kg.)***	***Use of compost bigha (in kg.)***	***Normal (production / bigha in kg.)***	***After us (Production / bigha in kg.)***
<7.5 Marginal	10	18	.32	200	173.45	140.55
7.5-15 Small	9	20	.59	375	308.50	321.45
15-22.5 low medium	8	20	.46	387	264	309.25
22.5-30	8	22	1.15	330	264	309.25

medium						
>30 big	6	23	1.1	440	331.50	427.75
Barga	4	19	.9	382	301.25	379.45
Kishan	5	23	.62	425	300	400.25

Source: - Direct field survey according to village dwellers and their statements, March, 2011

Table 2 : Use of advance technologies in kg under Aman production according to different size classes of land building.

Range (in bigha)	*No. of households*	*Use of Chemical fertilizer /bigha (in kg.)*	*Use of pesticides/ Bigha (in kg.)*	*Use of compost bigha (in kg.)*	*Normal (production / bigha in kg.)*	*After us (Production / bigha in kg.)*
<7.5 Marginal	10	20	.125	250	173.0	220.55
7.5-15 Small	9	20	.78	425	360.50	438.75
15-22.5 low medium	8	23	.184	430	375.15	460.50
22.5-30 medium	8	22	.25	470	416.25	500
>30 big	6	25	1.25	455	438.50	520.25
Barga	4	25	.75	400	284.75	350
Kishan	5	26	.94	420	320	390

Source: - Direct field survey according to village dwellers and their statements, March, 2011

Table 3 : Use of advance technologies in kg under Boro production according to different size classes of land building.

Range (in bigha)	*No. of households*	*Use of Chemical fertilizer /bigha (in kg.)*	*Use of pesticides/ Bigha (in kg.)*	*Use of compost bigha (in kg.)*	*Normal (production / bigha in kg.)*	*After us (Production / bigha in kg.)*

<7.5 Marginal	10	26	.42	175	180	220.50
7.5-15 Small	9	28	.93	285	260	350
15-22.5 low medium	8	32	1.32	480	445	525.50
22.5-30 medium	8	36	1.43	510	516.25	610.50
>30 big	6	37	1.15	495	454.50	560
Barga	4	27	.62	200	225	280.25
Kishan	5	28	.83	350	300	360

Source: - Direct field survey according to village dwellers and their statements, March, 2011

Table 4 : Use of advance technologies in kg under POTATO production according to different size classes of land building.

Range (in bigha)	*No. of households*	*Use of Chemical fertilizer /bigha (in kg.)*	*Use of pesticides/ Bigha (in kg.)*	*Use of compost bigha (in kg.)*	*Normal (production / bigha in kg.)*	*After us (Production / bigha in kg.)*
<7.5 Marginal	10	-	-	-	-	-
7.5-15 Small	9	30	.17	175	330.50	530
15-22.5 low medium	8	26	.08	250	250	380
22.5-30 medium	8	50	.52	840	1200	1800
>30 big	6	40	.36	700	801	1200
Barga	4	22	.07	150	200	280
Kishan	5	-	-	-	-	-

Source: Direct field survey according to village dwellers and their statements, March, 2011

Table 5 : Use of advance technologies in kg under MUSTARD production according to different size classes of land building.

Range (in bigha)	*No. of households*	*Use of Chemical fertilizer /bigha (in kg.)*	*Use of pesticides/ Bigha (in kg.)*	*Use of compost bigha (in kg.)*	*Normal (production / bigha in kg.)*	*After us (Production / bigha in kg.)*
<7.5 Marginal	10	8	.04	50	16050	25
7.5-15 Small	9	16	.23	100	40	65.50
15-22.5 low medium	8	29	.41	212	75	115
22.5-30 medium	8	14	0.15	100	32	50
>30 big	6	32	.42	350	92	114
Barga	4	10	0.1	70	21.50	38.25
Kishan	5	-	-	-	-	-

Source: Direct field survey according to village dwellers and their statements, March, 2011

Our crops production scenario has been changed with the invention and uses of chemical fertilizers, pesticides in agricultural field. Production has spurt out from its normal production. In the edge of 2009, it can be easily find out the dramatically changing scenario due to uses of these above technologies in farmland of *Goalpara* village near *Kopai River* of southern *Birbhum* (West Bengal). Around 38 percent farmers are marginal (land holder – less than 15 bigha / capita) in this village and they uses averagely 20 kg. chemical fertilizers and .45 kg. pesticides in per bigha *aush* production as a touch of modern techniques implementation in there agro land. For this, their *aush* production has energized with boosting from 266.5 kg. per bigha normal production to 329 kg in per bigha. Again 32 percent medium land holder (15-30 bigha /capita) farmers use average 17.5 kg. chemical fertilizer and .21 kg. pesticides in per bigha *aush* production. In this context, *aush* production has increased from 395.5 kg. per bigha normal production to 480 kg. per bigha averagely. On the other hand 12 percent big land holder farmers (>30 bigha in per capita) used average 25 kg. chemical fertilizer and 1.25 kg. pesticide in per bigha *aush* and lastly spurt of production came in front of them i.e. from

438.5 kg normal production to 520.5 kg. per bigha in averagely. Lastly around 18 percent landless farmers (*Barga*) used average 25.5 kg chemical fertilizer and .84 kg. pesticides in per bigha *aush* production and finally a growing figure has come to in front of this village i.e. from 302 kg. normal production to 370 kg. per bigha averagely.

Almost 38 percent farmers are marginal (land holder – less than 15 bigha / capita) in this village and they used averagely 19 kg. chemical fertilizers and .45 kg. pesticides in per bigha *aman* production as a touch of modern techniques implementation in their agro land. For this, their *aman* production has energized with boosting from 240.5 kg per bigha normal production to 271.5 kg. in per bigha. Again 32 percent medium land holder (15-30 bigha per capital) farmers use average 16 kg. chemical fertilizer and .80 kg . pesticides in per bigha *aman* production. In this context, *aman* production has increased from 264 kg per bigha normal production to 309 kg . per bigha averagely. On the other sided, 12 percent big land holder farmers (>30 bigha in per capita) used average 23 kg. chemical fertilizer and 1.1 kg . pesticide in per bigha *aman* and finally spurt of production came in front of them i.e. from 331.5 kg normal production to 427.75 kg per bigha in averagely. Lastly around 18 percent landless farmers (*Barga*) used average 21 kg. chemical fertilizer and .76 kg . pesticides in per bigha *aman* production and finally a growing figure has come to in front of this village i.e. from 300.5 kg normal production to 389.8 kg . per bigha averagely.

Almost 38 percent farmers are marginal (land holder – less than 15 bigha / capita) in this village and they uses averagely 27 kg. chemical fertilizers and .67 kg. pesticides in per bigha *boro* production as a touch of modern techniques implementation in their agro land. For this, their *boro* production has energized with boosting from 220 kg. per bigha normal production to 285 kg in per bigha. Again 32 percent medium land holder (15-30 bigha per capita) farmers use average 34 kg chemical fertilizer and 1.37 kg. pesticides in per bigha *boro* production. In this context, *boro* production has increased from 480.5 kg per bigha normal production to 567.5 kg. per bigha averagely. On the other sided 12 percent big land holder farmers (>30 bigha in per capita) used average 37 kg. chemical fertilizer and 1.1 kg . pesticide in per bigha *boro* and finally spurt of production came in front of them i.e. from 454.5 kg normal production to 560 kg per bigha in averagely. Lastly around 18 percent landless farmers (*Barga*) used average 27.5 kg chemical fertilizer and .72 kg. pesticides in per bigha *boro* production and finally a growing figure has come to in front of this village i.e. from 262.5 kg normal production to 320 kg. per bigha averagely.

So, in the omega stages, it can be concluded that with the application of these modern technologies the agro production has been boosted and the growth vis-a-vis improvement scenario has came to in front of this study village.

VULNERABLE AND RISK ASSESSMENT: FARMERS EXPERIENCE & EXPERIMENTAL OPINION

1. The continuous use of pesticide kills earthworms, snails, ladybirds and snakes. As for example, we cannot search small hillock like features made by earthworm in this village which is the source of soil fertility.

2. Many animals (like goats, ducks, cows, dogs, etc.) are also affected by the drinking of water in the pesticides sprayed fields.

3.In this case study region most of the farmers are very poor and can not afford to put on masks and globes during spraying pesticides so they developed many kinds of skin diseases and they feel dizzy while spraying pesticides. It is completely farmers own experience.

4. When the farmers walk on a field where ***Thaimad (***dust pesticides) is sprayed they are affected with a disease like ***Chilblain.*** It is the Risk assessment along the using of pesticides spraying.

5. The excessive use of pesticides and chemical fertilizers make ground hard and ultimately within a few years some of the agricultural land of this area become losses its fertility. The farmers are experiencing with this experience in last few years of this village.

6. In this area due to loftier use of pesticides and chemical fertilizers the original taste of rice has lost its own identity. This statement has deliberated by the farmers of this area.

7. There are many cows are stricken with many kinds of disease like fever, throat swelling, dysentery etc. due to eating of "***pesticides-sprayed"*** straw.

8. Before1990, due to rare use of revolutionary pesticides and chemical fertilizers, small-tiny ground level grasses was also available in this area after few months of harvesting. This is the main source of soil fertility. But today it is not available in

those fields. It is a new noxious dimension has generated for application of chemical fertilizer and pesticides in last 15^{th} years.

9. Calcium is an essential component for the growth of paddy. But an excessive use of pesticides prevents the solidification of calcium and this rice damages human ovary. It is the probable risk associated with the using excessive modern technologies.

10. In this village, due to surface run-off chemicals mixed water falls in different ponds. So, water hyacinths are grown in immense. This in turn exhausts the co_2 in water, causes inconveniences to the respiration of fishes and kills them. The rotten fishes create a gas, which pollutes air and water. Some of the harmful chemicals gather as sediment at the bottom of the pond, which leads to the death of fungi and bacteria suspended in the water so all the fishes are stricken with many diseases.

11. The strength of straw is diminished and its size is getting smaller due to the excessive use of chemical fertilizers. This risk statement has come to in front of us through farmers' comments during survey. In this respect we can elaborate that poorest people are largely depended on straw to make their houses roof. So, due to diminishing of the strength of straw, the rate of frequency to construct their roofs has been increasing today. For this causes farmers economy roughly affected.

12. As a result, for the excessive mixing of chemical fertilizers with soil many paddy fields turn in to fallow land as well as uncultivable waste land because after using chemicals in agricultural land, the soil organisms has been deteriorating and the soil status has moved to *dead-soil* (the soil which is free from living organism) & those are for the purpose of grazing of cattle, establishment of brick kilns which also born air pollution.

13. Now a day the parent seeds are almost extinct because huge HYV seeds are prepared from this original seeds and to cultivate this advanced seeds huge amount of ground water, strong chemical association are needed which is also related to the global problem like Desalinization, Desertification, & losses of ground water level.

14. Dissolved Nitrates and phosphorous leaching from the agricultural fields through surface run-off are added with nearer different ponds & Kopai River causes *Eutrophication of water* leading to a serious loss of aquatic life.

15. Production of Nitrous acid from fertilizers and Methane from water-logged rice are two most important pollutants being also the contributors to the *Leakage of the atmospheric Ozone layer.*

Flow chart showing the successive results of Eutrophication

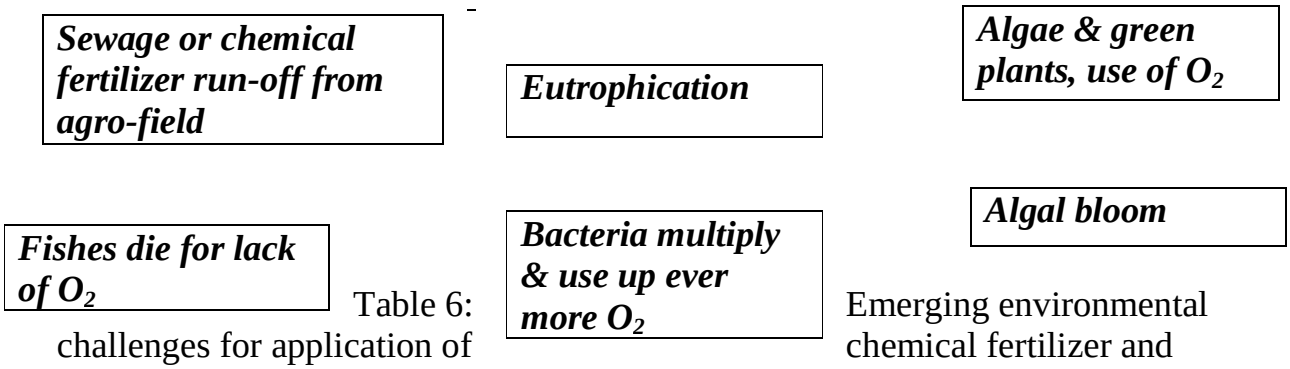


Table 6: Emerging environmental challenges for application of chemical fertilizer and compost in Agricultural environment.

Effect on	**Application of Nitrogenous & Phosphate fertilizer**	**Application of Chemical Compost**
Soil	Accumulation of heavy metals	Accumulation of phosphate & copper
Ground water	Nitrate leaching affecting water	Accumulation of nitrates & phosphates
Surface water	Run-off leaching	Eutrophication
Flora	Effect on micro flora, eutrophication leading to huge algae water plants	eutrophication leading to huge algae water plants
Fauna	eutrophication leading to O_2 depletion affecting aquatic fauna	eutrophication leading to O_2 depletion affecting aquatic fauna

Concluding Annotation with Measures:

The core causes of the crisis is not to be found how man interact with nature but how man interact with each other that to solved environmental crisis, we must solved the problem of paucity, racial unfairness and war, so, such solution are feasible only when we change our philosophy about our life, where consumerism have no place and the value of life are held high. To solve these problems the basic needs is to adopt agriculture policies to take the environment into account, reduce agricultural pollution to enhance the optimistic contribution that agriculture makes to environment. And also in order to regulate the production, use of fertilizers and

pesticides suitable legislation should be enacted in all countries and their compliance monitored the solutions lies perhaps in sustainable development. So, lastly we can develop the most important key point to solve this adverse effect, these are as follows:

1. Firmly enforcing and strengthening the existing environmental regulation.
2. Controlling agricultural production through decoupling income support from price support.
3. Reviewing the current research program.
4. Sprouting new ones which seek to reduced the adverse effect associated with the use of chemical fertilizers.
5. Develop an awareness concept among farmers.
6. To adopt the anti-pesticides programme and adopt the traditional agricultural practices.
7. In recent different bio-fertilizers (BGA) has been invented, farmers have to apply it in their agro-field.

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Foot Note: Normal production mean before using the chemical fertilizers and pesticides likes techniques in agriculture of this village.