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An evaluation of body mass index due to excess use of fertilizer and chemicals

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Abstract

In so far as incidence of smoking and drinking was concerned, Tables show that the proportion of regular smokers and drinkers was significantly higher in jaipur as compared to ganganagar. For example, on overall farm situation, while the proportion of regular smokers was around 78 per cent in ganganagar, it was 100 per cent in jaipur. Likewise, the proportion of regular drinker was as low as 2.20 per cent in ganganagar in comparison to as high as 71 per cent in jaipur.

Keywords: body mass index, smoking, drinking and working efficiency

Introduction

Agrochemicals used to increase agricultural productivity, have also been associated with many direct and indirect negative impacts on human health. These effects are increasingly manifested in loss of working efficiency resulting in higher cost of production. In recent times, the effects of commercialization of agriculture on environment and human health have attracted the attention of both the scholars and policy makers (Pingali *et al*, 1997; Pingali and Rosegrant, 1994) [5, 6].

The severity and risks of adverse impacts are higher in developing countries where users are quite often illiterate, ill-trained, and do not possess appropriate protective equipments. It is estimated that only 0.1 per cent of applied pesticides reach the target pests, leaving the bulk of pesticides (99.9 percent) to impact the environment and human health. The emphasis on organic agriculture is the direct outcome of the increasing awareness of the adverse effects of the excessive use of agro-chemicals. The present study is a modest attempt in this direction. Against this background, the present study aims at documenting the high value cash crops cultivation led adverse changes in the natural resource base, the strategies adopted by the local people to minimize the adverse impacts, monetary valuation of environmental costs, understand their implications for the livelihoods of the local people and suggest possible solutions. Such a study is essential in estimating the true cost of the cultivation of these crops. Keeping this in view, the study has been undertaken with the following objectives:

Materials and Methods

Selection of study area

Out of 33 districts of the state of rajasthan, two districts namely Sri Ganganagar and Jaipur were purposively selected for the study. The selection of the districts was influenced by two factors. First, in these districts the cultivation of high value crops namely kinnow and off-seasonal vegetable is being practiced since the late sixties and early seventies. Second, these two districts together account for more than three-fourths of the total area under fruits and vegetables

Collection and preparation of soil samples

The soil samples were separately collected from the cultivated area of each of the 200 sample households. Since kinnow was the most important crop in Sri Ganganagar and vegetables in jaipur, the soil samples were collected from kinnow orchards in Sri Ganganagar and vegetable fields in Jaipur. The representative soil samples were collected from 0-15 cm depth and tested under laboratory conditions. The samples were analyzed for soil PH Organic carbon, available P, available K and micro nutrient cations.

The following formula was used to classify the soils into different status:

$$\text{Overall Status of soil} = (1 * I + M * 2 + H * 3) / 100$$

The values used to classify the soils into low, medium and high through soil nutrient index are given below.

Low < 1.67, Medium 1.67 to 2.33 and high > 2.33.

The status of the availability of micro nutrients was considered sufficient if the availability was more than the following critical limits in mg per kilogram. If availability was less than these limits, the status was considered as deficient.

Zinc = 0.60

Copper = 0.20

Iron = 4.50

Manganese = 1.00

Valuation of environmental cost

Environmental cost has been defined to include the cost of the effect on human health and soil degradation. The effect on human health is estimated to include the number of days lost, the loss in the work efficiency for those who experienced some health problems but did not take medicines, the yearly medical expenditure of the person who handled the pesticides and the value of kit. For computing monetary value of the

degradation of soil health, the soil status was compared with the recommended doses in the packages of practices of horticulture and vegetable crops. If the status of a particular nutrient in the soil was high, then recommended dose, given in the package of practices, was reduced by 25 per cent. In case of medium status, the recommend was the same as given in the package of practices. If the status of a particular nutrient was low, 25 per cent was added to the recommended dose. These doses were now considered as optimum doses for a particular nutrient. Thereafter, actual dose used by the farmer was compared with the recommended dose. The difference for different nutrients from their recommended doses could either be excess or deficit. The excess or deficit amount then was converted into monetary value by multiplying the price of a particular nutrient with the excess or deficit amount. The total environmental cost then was apportioned among different crops in proportion to the area under these crops. As mentioned above, all the soil samples in Jaipur were collected from the area under vegetable crops. Therefore, the environmental cost in Jaipur was apportioned only among vegetable crops.

Result and Discussion

1.1 Incidence of smoking and drinking

Table 1

Particulars	Sri ganganagar			Jaipur		
	Small	Large	All	Small	Large	All
Smoke						
Regular	77.78	70.00	77.68	100.00	100.00	100.00
Irregular	22.22	0.00	21.95	0.00	0.00	0.00
Non smoker	0.00	10.00	0.37	0.00	0.00	0.00
Drink						
Regular	2.22	0.00	2.20	74.29	55.17	71.40
Irregular	97.78	90.00	97.68	25.71	44.83	28.60
Non drinker	0.00	10.00	0.12	0.00	0.00	0.00

1.2 Pesticides impact on health

The data presented in Table 2 shows that farmers in jaipur district had been using pesticides for a long time. For example, two fifths of them (40.34 per cent) were using

pesticides for the last 25 to 30 years. In both the district, 50 per cent and more farmers had been using pesticides in the range of 20-25 years.

Table 2: Years and frequency of spraying pesticides and adoption of IPM (table 2)

Years	Sri ganganagar			Jaipur		
	Small	Large	All	Small	Large	All
10-15	1.11	0.00	1.10	0.00	0.00	0.00
15-20	21.11	60.00	21.59	11.43	0.00	9.66
20-25	53.33	20.00	52.93	50.00	50.00	50.00
25-30						
Frequency of spraying(no.)	24.44	20.00	24.39	38.57	50.00	40.34
Adoption of IPM						
Yes	20.00	100.00	28.00	11.43	25.00	13.65
No	80.00	0.00	80.00	88.57	75.00	86.35

The table also reveals that frequency of spraying was a little higher in ganganagar compared to jaipur. It was interesting to find that 21 per cent and 14 per cent of the households had

adopted integrated pest management in ganganagar and jaipur district, respectively

Table 3: Pesticide use and its impact on pollinators (table 3)

Factors	Sri ganganagar			Jaipur		
	Small	Large	All	Small	Large	All
No. of spray						
1-2	0.00	0.00	0.00	4.29	0.00	3.62
3-5	12.22	0.00	12.07	24.29	0.00	20.52
6-8	42.22	100.00	42.93	71.43	100.00	75.86
9-10	45.56	0.00	45.00	0.00	0.00	0.00
Pesticide sprayed during flowering						
Type of pesticide						
Insecticide	100	100	100	100	100	100
Fungicides	100	100	100	100	100	100
Time of spray						
Before flowering	100.00	100.00	82.00	71.43	100.00	44.00
During flowering	77.78	20.00	63.20	92.86	83.33	53.00
During fruiting	100.00	100.00	100.00	100.00	100.00	100.00
After fruiting	77.78	20.00	63.20	92.86	83.33	53.00
For color	61.11	60.00	60.99	0.00	6.67	2.00
Do pesticide kill insect pollinators and bees						
Yes	88.89	100.00	89.02	57.14	73.33	59.66
No	2.22	0.00	2.20	28.57	10.00	25.69
Don't know	8.89	0.00	8.78	14.29	16.67	14.66

Table 3 shows different aspects of pesticide use like frequency of spray, type of pesticides, time of spray, etc. The table reveals that 45 per cent of the households were resorting to 9 to 10 sprays in gangannagar while around 43 per cent of households were caring out 6-8 sprays. On the other hand, in jaipur a little more than three fourths of the farmers were spraying pesticides from 6 to 8 times while one-fifth of households were doing so 3 to 5 times. Further, 100 per cent

of the large households reported using insecticides and fungicides for the spray in both the blocks.

All farmers in both the districts applied pesticide at the time of flowering, fruiting and after fruiting. In gannganagar district, 50 per cent of the households applied pesticides for colour, but barely 2 per cent of the farmers did so in jaipur. That the use of pesticides kill insects, pollinators and bees was reported by 89 per cent of the farmers in ganganagar and 60 per cent in jaipur.

Table 4: Farmers' perception about the effect of prolonged use of pesticides (table 4)

Particulars	Sri ganganagar			Jaipur		
	Small	Large	All	Small	Large	All
Yes	81.11	100.00	81.34	71.43	66.67	70.69
No	18.89	0.00	18.66	28.57	33.33	29.31
Degree of effects						
Very little	5.56	0.00	5.49	11.43	0.00	9.66
High	22.22	20.00	22.20	74.29	16.67	65.34
Very high	72.22	60.00	72.07	14.29	76.67	23.97
Extremely high	0.00	20.00	20.00	0.00	6.67	6.67

Table 4 presents response of the farmers about the effect of prolonged use of pesticides on health. The table shows that 81.34 per cent of the farmers in ganganagar were aware of fact that prolonged pesticides use can effect health. The proportion of such households was 70.69 per cent in jaipur. In ganganagar district, on overall farms, 72.07 per cent of the farms reported that pesticides had very high effect on their health followed by 22.20 per cent of households who reported high effect of pesticide use

Table 1 shows that majority of the farmers reported to have experienced acute illnesses due to pesticides exposure. Most of them (86 per cent) opined that they had experienced eye irritation (86 per cent) followed by 81 per cent who reportedly experienced fatigue, 66 per cent skin irritation, head ache and back pain, 56 per cent vomiting, 22 per cent dizziness and 1 per cent eye discharge. In jaipur district, 77.5 per cent of the respondents reported eye irritation and back pain, 77.30 per cent fatigue and headache, 41 per cent vomit and skin irritation, 31 per cent eye discharge and 9 per cent dizziness.

Table 5: Pesticide poisoning: symptom of pesticides (table 5)

symptom	Sri ganganagar			Jaipur		
	Small	Large	All	Small	Large	All
Eye irritation	84.44	100.00	86.00	74.29	85.00	77.50
Headache	58.89	60.00	59.00	75.71	80.00	77.00
dizziness	20.00	40.00	22.00	8.57	10.00	9.00
Vomit	55.56	60.00	56.00	51.43	16.67	41.00
Back pain	58.89	60.00	59.00	75.00	83.33	77.50
Skin irritation	64.44	80.00	66.00	30.00	66.67	41.00
Eye flue	0.00	10.00	1.00	30.00	33.33	31.00
fatigue	80.00	90.00	81.00	77.00	78.00	77.30
Available clinical facilities						
Yes	82.22	100.00	82.44	74.29	80.00	75.17
No	17.78	0.00	17.78	25.71	20.00	24.83

The clinic facilities were availed by 82 per cent and 75 per cent of the respondents after the illness caused by pesticide exposure in ganganagar and jaipur district, respectively. In

ganganagar, 17.78 per cent farmers and in jaipur district 24.84 per cent farmers had not availed clinic facilities after the illness due to pesticides exposure.

Table 6: Physical characteristics in terms of body mass index (percentage of respondent)

Particulars	Sri ganganagar			Jaipur		
	Small	Large	All	Small	Large	All
Under weight	8.89	10.00	8.90	18.57	13.33	17.76
Normal	77.78	90.00	77.93	67.14	66.67	67.07
Over Weight (kg)	11.11	0.00	10.98	14.29	16.67	14.66
Obese	2.22	0.00	2.20	0.00	3.33	0.52

In so far as incidence of smoking and drinking was concerned, Table 6 shows that the proportion of regular smokers and drinkers was significantly higher in jaipur as compared to ganganagar. For example, on overall farm situation, while the proportion of regular smokers was around 78 per cent in ganganagar, it was 100 per cent in jaipur. Likewise, the proportion of regular drinker was as low as 2.20 per cent in ganganagar in comparison to as high as 71 per cent in jaipur.

Conclusion

High value cash crops has made a significant impact on the economic status of the farmers in terms of their income and employment. It is, therefore, no wonder that policy makers are busy devising strategies to promote agricultural diversification. However, while crop diversification has resulted in higher income and employment to the farmer households, it has also promoted indiscriminate use and unscientific handling of toxic chemicals which is causing degradation of natural resource base and also affecting human health. There is an imposing evidence to indicate that as the process of agricultural diversification towards these crops gets intensified and gains momentum, the extent, severity and frequency of associated health problems are increasing at an alarming rate.

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