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Ashutosh Sharma
PG Student, Department of Agricultural Extension India Gandhi Krishi Vishwa Vidyalaya, Raipur, Chhattisgarh, India

ML Sharma
Professor and Head, Department of Agricultural Extension India Gandhi Krishi Vishwa Vidyalaya, Raipur, Chhattisgarh, India

GK Shrivastava
Professor, Department of Agronomy India Gandhi Krishi Vishwa Vidyalaya, Raipur, Chhattisgarh, India

PK Joshi
Professor, Department of Genetics and Plant Breeding, India Gandhi Krishi Vishwa Vidyalaya, Raipur, Chhattisgarh, India

Correspondence
Ashutosh Sharma
PG Student, Department of Agricultural Extension India Gandhi Krishi Vishwa Vidyalaya, Raipur, Chhattisgarh, India

Existing cultivation practices of potato growers with fertilizer and chemical application in tribal areas of Chhattisgarh

Ashutosh Sharma, ML Sharma, GK Shrivastava and PK Joshi

Abstract
The present study was conducted in Surguja District of Chhattisgarh. The study revealed that, majority of respondents 57.50 per cent were having cultivation of potato on up to 2 ha of land, 67.5 per cent of respondents had arranged the seed by broker, none of the respondents were found in the category of self preparing the seed of potato. Usually farmers have tendency to apply high seed rate, which leads to high competition. In case of potato, nearly 65.84 per cent of respondents were using seed rate of 5.1-7 q ha^{-1}. Majority of respondents 73.34 per cent were doing seed treatment by chemical (Bavistin, indofil m-45, thiuram, egalal (2-3 ml/litre), Maximum of the respondents (56.66%) were growing kufri badshah. Regarding type of seed material shows that cent per cent of the respondents were using tuber as seed material. 54.16 per cent of respondents were cultivating the potato with 81-150 kg ha^{-1} nitrogen, (42.5%) were cultivating potato by using phosphorus up to 50 kg ha^{-1}, and (54.16%) were cultivating the potato by using potash up to 50 kg ha^{-1}, As regards to use of FYM, 75.00 per cent of respondents were cultivating the potato without application of F.Y.M., data regarding weed control 55.84 per cent of respondents followed weed control measure manually, majority of respondents (88.34%) were applying chemical for protection of crop. Cent per cent of respondents were using digging method for harvest the potato crop. Maximum of respondents 54.17 per cent were not storing the produce, (80.84%) were adopting other method (out of state/ from home) for saling their produce.

Keywords: Existing cultivation practices, potato growers, fertilizer and chemical application, tribal area

Introduction
In India, Potato is cultivated in almost all states under diverse agro-climate conditions. About 85 per cent of Potatoes are cultivated in Indo-gangetic plains of North India. The states of Uttar Pradesh, West Bengal, Punjab, Bihar and Gujarat accounted for more than 80 per cent share in total production. The top ten state wise production of Potato in India (production ('000 t) UP (9821.7), West Bengal (7076.6), Punjab (1381), Gujarat (1088.7), Bihar (1062.8), Madhya Pradesh (752.6), Assam (589.1), Karnataka (361.0), Haryana (323.9), Uttaranchal (261.2), and their per centage 43.31, 31.21, 5.90, 4.80, 4.69, 3.32, 2.60, 1.59, 1.43, 1.15 (Bhajantri, 2011).

In Chhattisgarh, potato is cultivated in almost all districts but among of them top most potato cultivated districts and their area (in hectare) and production (in metric ton) are Surguja (6050.00), Bilaspur (4842.08), Surajpur (4800.00), Raigarh (3360.00), Raipur (2851.00) and their production are 93472.50, 22755.00, 74160.00, 51912.00 and 44047.95, respectively. The total area under potato in Chhattisgarh is 41204.97 hectares and production is 579177.74 metric ton (Anonymous, 2011-12b) [3].

It is utilized in variety of ways, such as preparation of chips, wafers, flakes, granules, flour, starch, potato-custard powder, soup or gravy thickener, pan cakes as a process food.

The nutritive value of potato in which the constituents of potato per 100 g, in which water, carbohydrates (Starch and sugar), proteins, fibre, fat, and minerals, contents are 74.70, 22.60, 1.60, 0.40, 0.10, and 0.60 per cent, respectively. The minerals and vitamins as available in potato in which vitamin C, phosphorus, magnesium, and potassium, content are 14.0-25.0, 40.3, 24.2, 586.0 (mg/ 100 g of fresh weight) are found in high amount in fresh weight of potato.

Varieties like Kufri, Chipsona-1, Kufri Chipsona-2, Kufri Jyoti, Kufri Luvkar, Kufri Chandramukhi have been released recently by different research organizations for processing purposes. In India, there is a great scope for cultivation of potato suitable for processing. Further, there is a rising demand for quality processed potato products from the country particularly in Middle East. The countries like Japan, Singapore, Korea, Malaysia, China also have a great demand for processed potato products as well as fresh potato for processing purpose. Thus, the potato processing has opened a new dimension for development of agro based industries in the country (Anonymous, 1999) [2].

Material and Methods

The study was conducted in the Surguja district of Chhattisgarh state. The Chhattisgarh state consist of 27 district, out of which Surguja district was selected because this district was feasible for author as well as it is second highest potato population bearing district in the Chhattisgarh. Out of total 7 blocks in the district only Mainpath block selected purposively because maximum number of potato growers are living in this block as compared to other blocks and proximity to Agriculture University and transfer of technology center. 10 villages were selected randomly on the basis of maximum availability of potato growers in the villages. From selected block 12 potato growers were selected randomly from each selected villages. Thus, the total 120 potato growers were considered as respondent for this study. The data were collected personally through pre-tested interview schedule which was prepared on the basis of objectives of the study. Collected data were processed and tabulated by using appropriate statistical methods.

Results and Discussion

Existing potato cultivation pattern among the respondents

Existing cultivation practices of potato adopted by the respondents in the study area was recorded. This will form the basis for the future strategy and also the guideline for improvement. As far as the existing cultivation practices of potato are concerned, data was collected from the respondents and is compiled, analyzed.

Table 1 shows that the data regarding area under cultivation reveals that majority of the respondents (57.50%) were having cultivation of potato on up to 2 ha of land, while 22.50 per cent respondents were having cultivation on 2.1-3 ha of land and only 20.00 per cent were having cultivation on more than 4 ha of land. The data regarding arrangement of seed reveals that 67.5 per cent of respondents had arranged the seed by broker, followed by market (25.83%) and other Govt. sources (6.67%). None of the respondents were found in the category of self-preparing the seed of potato. Usually farmers have tendency to apply high seed rate, which leads to high competition. In case of potato, nearly 65.84 per cent of respondents were using seed rate of 5.1-7 q ha^{-1}. While, 17.50 and 16.66 per cent of respondents were using up to 5 q ha^{-1} and above 7 q ha^{-1} of seed rate, respectively.

Seed born diseases can be controlled by seed treatment. It is a cheap, simple and effective method. Majority of respondents (73.34%) were doing seed treatment by chemical (Bavistin, indofil m-45, thiuram, egalal (2-3 ml/litre), whereas, 26.66 per cent of respondents were not interested in seed treatment. Variety is one of the most important components of yield. Generally the farmers are not aware about the name of potato varieties. Majority of the respondents (56.66%) were growing kufri badshah, followed by 43.33 per cent of respondents were growing kufri jyoti. Similarly 10.83, 5.83 and 4.16 per cent of respondents were growing kufri mangla, kufri sinduri and other varieties. The data regarding type of seed material reveals that cent per cent of the respondents were using tuber as seed material.

The data regarding fertilizer & manure reveals that majority of the respondents (54.16%) were cultivating the potato with 81-150 kg ha^{-1} nitrogen, and about 30.00 per cent of respondents were cultivating the potato by using nitrogen up to 80 kg ha^{-1}, whereas only 15.84 per cent of respondents were not using of nitrogen. Majority of the respondents (42.5%) were cultivating potato by using phosphorus up to 50 kg ha^{-1}, 40.84 per cent of the respondents were cultivating potato by using 51-100 kg ha^{-1} of phosphorus and only 16.66 per cent of respondents were not using phosphorus. Majority of respondents (54.16%) were cultivating the potato by using potash up to 50 kg ha^{-1}, 25.84 per cent were using 51-100 kg ha^{-1} and 20.00 per cent of respondents were not using of potash. As regards to use of FYM, 75.00 per cent of respondents were cultivating the potato without application of F.Y.M., whereas 14.16 and 10.84 per cent of respondents were using 7-12 t ha^{-1} and 4-6 t ha^{-1} of F.Y.M, respectively Table 2.

Table 3 indicated that the data regarding weed control reveals that majority of respondents (55.84%) followed weed control measure manually, whereas 24.16 per cent of respondents were used weed control by mechanical method and 20.00 per cent of respondents used chemical (metribejin, 2-4D, etc) method. Regarding plant protection measures, majority of respondents (88.34%) were applying chemical for protection of crop and 11.66 per cent of respondents were not using any chemical.

The data regarding harvesting of potato reveals that cent per cent of respondents were using digging method for harvest the potato crop. As regards to storage of produce after harvesting, majority of respondents (54.17%) were not storing the produce, whereas 29.17 per cent of respondents were storing the produce in dry and cool place in home followed by storage in gunny bag (16.66%). The data regarding marketing of produce indicate that majority of respondents (80.84%) were adopting other method (out of state/ from home) for saling their produce, followed by middle man (10.00%), and local market (9.16%) is presented in Table 4.

Table 1: Distribution of the respondents according to their seed related practices (n=120)

Existing Practices	Frequency	Percentage
Area under cultivation		
Up to 2 ha	69	57.50
2.1-3 ha	27	22.50
Above 4 ha	24	20.00
Arrangement of seed		
Self prepared	00	00.00
From market	31	25.83
By broker	81	67.50

Other (Govt. provided)	08	06.67
Seed rate		
Up to 5 q ha^{-1}	21	17.50
5.1-7 q ha^{-1}	79	65.84
Above 7 q ha^{-1}	20	16.66
Seed treatment		
No use	32	26.66
By Chemical Bavistin, Indofil M-45, Thiuram, Egalal (2-3 ml l^{-1})	88	73.34
Popular varieties*		
Kufri jyoti	52	43.33
Kufri badshah	68	56.66
Kufri mangla	13	10.83
Kufri sinduri	7	5.83
Other	5	4.16
Type of seed material		
By tuber	120	100
By T.P.S.(True potato seed)	00	0.00

Table 2: Distribution of the respondents according to their Fertilizer, Manure and chemical application uses (n=120)

Existing Practices	Frequency	Percentage
Fertilizer & manure		
Nitrogen		
No use	19	15.84
Up to 80 kg ha^{-1}	36	30.00
81-150 kg ha^{-1}	65	54.16
Phosphorus		
No use	20	16.66
Up to 50 kg ha^{-1}	51	42.50
51-100 kg ha^{-1}	49	40.84
Potash		
No use	24	20.00
Up to 50 kg ha^{-1}	65	54.16
51-100 kg ha^{-1}	31	25.84
FYM		
No use	90	75.00
4-6 t ha^{-1}	13	10.84
7-12 t ha^{-1}	17	14.16

Table 3: Distribution of the respondents according to their weed control and plant protection practices (n=120)

Particular	Frequency	Percentage
Weed control		
Manual	67	55.84
Mechanical	29	24.16
Chemical (Metribuzin,2-4D,etc)	24	20.00
Plant protection measures		
No use of chemical	14	11.66
Chemical (For insect-Endosulfan 35EC/Methyl demeton 1000 ml l^{-1}) (For diseases-Dithane M 45/indofil/cypermethrin25EC/quinalphos)	106	88.34

Table 4: Distribution of the respondents according to their Harvesting, Storage and Marketing practices (n=120)

Existing Practices	Frequency	Percentage
Harvesting of potato		
Digging	120	100
Other method	00	00
Storage		
No storage	65	54.17
In gunny bag	20	16.66
Dry and cool place in home	35	29.17
Marketing of produce		
In local market	11	09.16
Through middle man	12	10.00
Other (out of state / from home, etc)	97	80.84

Conclusion

It concluded from the study, according to cultivation of potato 57.50 per cent were having potato on up to 2 ha of land, 67.5 per cent of respondents had arranged the seed by broker Further the study also concluded that, 65.84 per cent of respondents were using seed rate of 5.1-7 q $ha^{-1}$and 73.34 per cent were doing seed treatment by chemical, (56.66%) were growing kufri badshah, cent per cent of the respondents were using tuber as seed material. 54.16 per cent of respondents were cultivating the potato with 81-150 kg ha^{-1} nitrogen, (42.5%) were using phosphorus up to 50 kg ha^{-1}, (54.16%) were using potash up to 50 kg ha^{-1}, As regards to use of FYM, 75.00 per cent of respondents were cultivating the potato without application of F.Y.M, (88.34%) were applying chemical for protection of crop. Cent per cent of respondents were using digging method for harvest the potato crop. 54.17 per cent were not storing the produce.

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