PLANT SCIENCE TODAY
ISSN 2348-1900 (online)
Vol x(x): xx–xx
https://doi.org/10.14719/pst.2156

HORIZON
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RESEARCH ARTICLE

The extent of adoption of off-season vegetable cultivation by tribal farmers in Koraput district of Odisha

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OPEN ACCESS

ARTICLE HISTORY
Received: 28 December 2022
Accepted: 19 June 2023
Available online
Version 1.0 : 11 September 2023

Check for updates

Additional information

Peer review: Publisher thanks Sectional Editor and the other anonymous reviewers for their contribution to the peer review of this work.

Reprints & permissions information is available at https://horizonepublishing.com/journals/index.php/PST/open_access_policy

Publisher's Note: Horizon e-Publishing Group remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

Indexing: Plant Science Today, published by Horizon e-Publishing Group, is covered by Scopus, Web of Science, BIOSIS Previews, Clarivate Analytics, NAAS,UGC Care etc. See https://horizonepublishing.com/journals/index.php/PST/indexing_abstracting

CITE THIS ARTICLE
Rout D S, Barla G W, Nandy A, Kumar S Mahapatra. The extent of adoption of off-season vegetable cultivation by tribal farmers in Koraput district of Odisha. Plant Science Today (Early Access). https://doi.org/10.14719/pst.2156

Abstract

The study on the "Extent of adoption of off-season vegetable cultivation by tribal farmers in Koraput district of Odisha" was conducted using Ex-Post-Facto research design. The study was conducted in the Koraput and Semiliguda blocks of Koraput district, Odisha, with a sample size of 120. The study used an ex-post facto research approach that combined random and purposeful sampling methods. While the gram panchayats, villages, and respondents were chosen at random, the district and blocks were purposefully chosen. The responses were obtained from each individual respondent through a structured interview schedule. Regarding adoption, the majority (75%) of off-season vegetable growers had medium adoption levels. With mean scores of 2.93, 3.00, 3.00, 2.87, 2.75, and 1.25 in regards to production, management, conservation, marketing, training, and capacity building, as well as supporting data, farmers have more adoption of land suitability, crop rotation, across-slope ploughing, input availability, discussion meetings, and crop insurance, respectively. To augment off-season vegetable production in the state in general and Koraput in particular, the latest proven and viable technology for off-season vegetable production needs to be diffused through various extension activities to accelerate its adoption. Again, the new, tried-and-true vegetable-growing techniques should be disseminated through several extension programmes to speed their adoption.

Keywords

Off-season vegetable; Tribal farmer; Cultivation; Adoption

Introduction

Koraput district of Odisha, a regressive region with a more tribal population, is represents in excess of half of the total population of the region. Even though there is plenty of room for tribal children in many agricultural firms, their inferior skill sets require them to work in manual labour. Future entrepreneurs, innovators, and leaders are among the tribal kids (1). The monetary existence of most of the individuals in the locale revolves around horticulture and timberland-related activities. Financially, they are not on par with farmers in other regions of the state. Even after setting a target of doubling farmers' income by 2022, not many youths are attracted to agriculture (2). Again, the production of a range of vegetable crops year-round in southern Odisha has high potential due to the agro-climatic

conditions and deep sandy-loam to clay-loam soils (3). In some areas of Koraput, the climate is favourable for growing off-season vegetables in different altitude zones, even with gentler temperatures (4). The post-rainstorm months are October, and November. The district is impacted by the downturn from the Bay of Bengal, especially during the months of September and October which cause high winds and widespread heavy rains. This is an ideal condition for growing vegetables (5).

Considering fast population growth combined with the expanded buying intensity of individuals and the advancement of the new town, interest in new and quality vegetables is rising. Prior, a large portion of the vegetables were developed occasionally, but the new breeding procedures and progressed strategies, combined with favourable climatic conditions, have empowered the all-year creation of off-season vegetables. In the lean season, vegetables are hard to find, and costs have shot up, giving a sizeable benefit to the farmers because of heavy interest (6). Again, due to the larger number of tribal populations along with a low literacy rate (7), constraints regarding the adoption of new practices are greater (8). There is also a need to improve the production and productivity of off-season vegetables through advanced procedures to meet the required amounts of vegetables in the diet and make off-season vegetable production a beneficial endeavour. Thus, this study was carried out to analyze the conservation measures, market availability, rate of adoption and farmers' decisions in the adoption of the cultivation of off-season vegetables by tribal farmers. Further, it could also be analyzed in depth, including the problems, and suggestions by any of the extension personnel.

Materials and Methods

The present study was carried out in the Semiliguda and Koraput blocks of the Koraput district of Odisha. A total of 120 respondents were selected for the analysis. An ex-post-facto research design having both purposive and random sampling techniques was undertaken for the study. The district and blocks were selected purposefully whereas the gram panchayats, villages, and respondents were randomly selected. This study area was selected as it comprises more than 50% of the tribal population of the whole population, and the natives of this area have a major share in the production of off-season vegetables.

The mental process that a person goes through between learning about innovation and adopting it, according to Rogers, 1976 (9), is known as the adoption process. Hence, the adoption level of off-season vegetable growers on production aspects, management aspects, conservation aspects, marketing, training, and capacity building with supportive facts on off-season vegetable growing technologies was determined and tested through a specific 3-point scale, where 3 represents full adoption rates, 2 represents partial adoption rates, and low adoption rates are represented by 1. The data were collected, tabulated, and analyzed by using different statistical tools like percentage, mean scores, standard deviation, and rank order. The data were analyzed using the IBM SPSS Statistics (Version-21) predictive analytics software.

Results and Discussion

Adoption is the process ofacceptance and full utilization of an innovation. Hence, to study the level of adoption, an effort was made to sort out the vegetable production technologies into six broad aspects. The sample area is a vegetable pocket in the Koraput district of Odisha. The farmers are doing vegetable cultivation for a long time. Here, the experience of sample tribal farmers in vegetable cultivation was identified.

Production aspects

Adoption of land suitability (mean score = 2.93) ranked 1st due to experience gained through years of vegetable growing (Table 1, Figure 1). Field preparation, improved yield and drought-resistant variety, optimum seed rate, the skill of vegetable growing, optimum spacing, and appropriate time of sowing/transplanting with mean scores of 2.90, 2.84, 2.83, 2.78, 2.75 ranked 2nd, 3rd, 4th, 5th, and 6th respectively. The least adopted was FYM/Compost requirement (mean score = 2.68) which ranked 7th. It was due to being the product of self so less concerned. The average extension gap (109 qha^{-1}) and IBCR (38) are high enough to encourage farmers to start growing cabbage

Table 1. Adoption of basics of production in off-season vegetable growing (n = 120)

Sl. No.	Statement	Fully adopted		Partially adopted		Not adopted		Mean	Rank
		f*	%*	f*	%*	f*	%*		
I	Switch over from subsistence to commercial vegetable growing	102	85.00	15	12.50	3	2.50	2.83	IV
II.	Skill of Vegetable growing	101	84.17	12	10.00	7	5.83	2.78	V
III.	Crop Production technology								
a.	FYM / Compost requirement	87	72.50	28	23.33	5	4.17	2.68	VII
b.	Field Preparation	110	91.67	8	6.67	2	1.67	2.90	II
c.	Improved, high yield & drought-resistant variety	108	90.00	5	4.17	7	5.83	2.84	III
d.	Land suitability	111	92.50	9	7.50	0	0.00	2.93	I
e.	Optimum Seed rate	106	88.33	7	5.83	7	5.83	2.83	IV
f.	Optimum Spacing	102	85.00	6	5.00	12	10.00	2.75	VI
g.	Appropriate time for sowing/ Transplanting	101	84.17	8	6.67	11	9.17	2.75	VI

f* Frequency, **%*** Percentage.

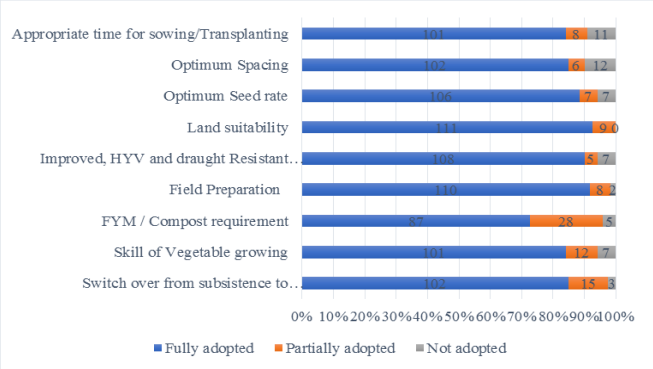

Figure 1. Adoption of basics of production in off-season vegetable growing

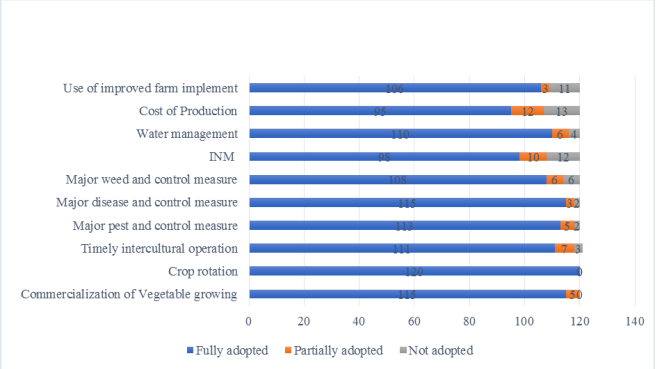

Figure 2. Adoption of management intervention in off-season vegetable growing

outside of the growing season. Analysis using correlation and regression of a variety of independent variables revealed that young, trained growers adopt off-season cabbage farming at a high rate (10).

Once more, an effort has been made to divide the respondents into categories like 'low', 'medium', and 'high' based on their level of adoption.

Management aspects

Crop rotation (mean score = 3.00) ranked 1st. The reason could be that farmers change crops every time on the same piece of land (Table 2,Figure 2). Commercialization of vegetable growing, major disease and control measures, major pest and control measures, timely intercultural operation, water management, major weed and control measures, use of improved farm implements, and INM with mean scores of 2.96, 2.94 2.93, 2.92; 2.88, 2.85, 2.79, and 2.72 ranked 2nd, 3rd, 4th, 5th, 6th, 7th, 8th, and 9th, respectively. Family labour was involved in production so farmers did not realize the cost of production; hence, ranked 10th with (mean score = 2.68). The production processes have a significant impact on the farmers' varietal preferences. Breeders can create high-impact varieties by identifying the convergence and divergence of varietal preferences across production settings (11).

Adoption of conservation measures

Across the slope, ploughing was practice practiced by all so it was ranked 1st (mean score of = 3.00), followed by soil conservation, moisture conservation, mulching, and genome conservation, with mean scores of 2.83, 2.76, 2.67 and 2.64 ranked 2nd, 3rd, 4th, and 5th, respectively (Table 3,Figure 3). For a broader, deeper, and more dynamic process of learning and change aimed at establishing appropriate and equitable human activity systems and ways of life (i.e., culture), sustainable development should be combined with the abundance of natural resources (12).

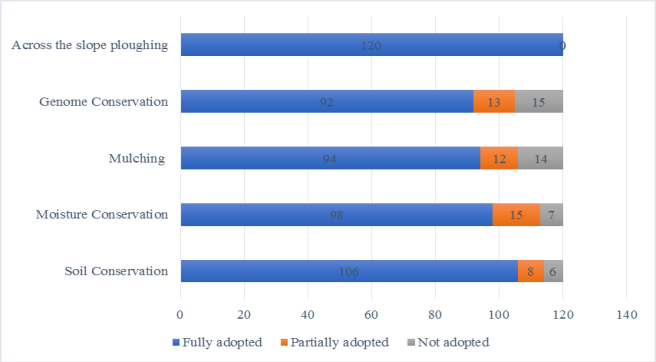

Figure 3. Adoption of conservation measures in off-season vegetable cultivation

Table 2. Adoption of management intervention in off-season vegetable growing (n = 120)

Sl. No.	Statement	Fully adopted		Partially adopted		Not adopted		Mean	Rank
		f	%	f	%	f	%		
a.	Commercialization of Vegetable growing	115	95.80	5	04.17	0	00.00	2.96	II
b.	Crop rotation	120	100	0	00.00	0	00.00	3.00	I
c.	Timely intercultural operation	111	92.50	7	05.83	3	02.50	2.92	V
d.	Major pest and control measure	113	94.17	5	04.17	2	01.67	2.93	IV
e.	Major disease and control measure	115	95.83	3	02.50	2	01.67	2.94	III
f.	Major weed and control measure	108	90.00	6	05.00	6	05.00	2.85	VII
g.	INM	98	81.67	10	08.33	12	10.00	2.72	IX
h.	Water management	110	91.67	6	05.00	4	03.33	2.88	VI
i.	Cost of Production	95	79.17	12	10.00	13	10.83	2.68	X
j.	Use of improved farm implement	106	88.33	3	02.50	11	09.17	2.79	VIII

Table 3. Adoption of conservation measures in off-season vegetable cultivation (n = 120)

Sl. No.	Statement	Fully adopted		Partially adopted		Not adopted		Mean	Rank
		f	%	f	%	f	%		
a.	Soil Conservation	106	88.33	8	6.67	6	5.00	2.83	II
b.	Moisture Conservation	98	81.67	15	12.50	7	5.83	2.76	III
c.	Mulching	94	78.33	12	10.00	14	11.67	2.67	IV
d.	Genome Conservation	92	76.67	13	10.83	15	12.50	2.64	V
e.	Across the slope ploughing	120	100	0	00.00	0	0.00	3.00	I

Adoption of market and marketing

Adoption of input availability place (mean score = 2.87) ranked 1st followed by profit maximization and market information, produce disposal place, marketing channel, post-harvest grading/packing, and storage facility with mean scores of 2.83, 2.73, 1.67, 1.42, and 1.30 ranked 2nd, 3rd, 4th, 5th, and 6th, respectively (Table 4,Figure 4). The market and governmental frameworks decide whether people are in poverty or in good health (13).

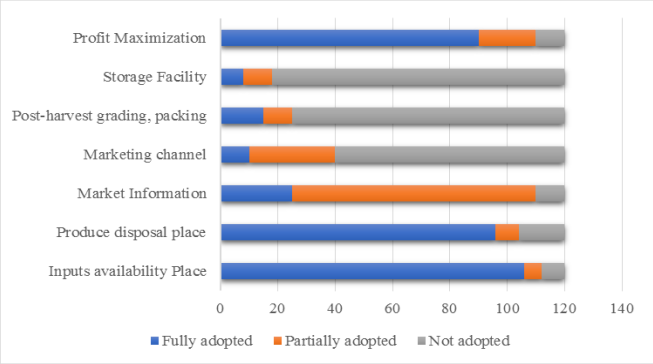

Figure 4. Adoption of market and marketing in off-season vegetable cultivation

Adoption of training and capacity building

Discussion meeting (mean score = 2.75) ranked 1st, followed by training programme need, acclimatization needs to the new venture, exhibition, farmers fair, and exposure visit need with a mean scores of 2.69, 2.56, 2.54, 2.53, and 2.19 ranked second, third, fourth, fifth, and sixth in the adoption of aspects of training, and capacity building respectively (Table 5,Figure 5).

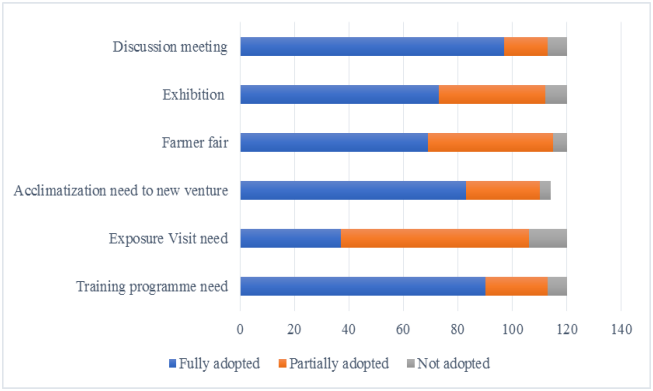

Figure 5. Adoption of programme on skill enhancement and exposure need

Table 4. Adoption of market and marketing in off-season vegetable cultivation (n = 120)

Sl. No.	Statement	Fully adopted		Partially adopted		Not adopted		Mean	Rank
		f	%	f	%	f	%		
a.	Inputs availability Place	106	88.33	6	5.00	8	6.67	2.87	I
b.	Produce disposal place	96	80.00	8	6.67	16	13.33	2.73	III
c.	Market Information	25	20.83	85	70.83	10	8.33	2.83	II
d.	Marketing channel	10	8.33	30	25.00	80	66.67	1.67	IV
e.	Post-harvest grading, packing	15	12.50	10	8.33	95	79.17	1.42	V
f.	Storage Facility	8	6.67	10	8.33	102	85.00	1.30	VI
g.	Profit Maximization	90	75.00	20	16.67	10	8.33	2.83	II

Table 5. Adoption of programme on skill enhancement and exposure need (n = 120)

Sl. No.	Statement	Fully adopted		Partially adopted		Not adopted		Mean	Rank
		f	%	f	%	f	%		
a.	Training programme need	90	75.00	23	19.17	7	5.83	2.69	II
b.	Exposure Visit need	37	30.83	69	57.50	14	11.67	2.19	VI
c.	Acclimatization need to new venture	83	69.17	27	22.50	4	3.33	2.56	III
d.	Farmer fair	69	57.50	46	38.33	5	4.17	2.53	V
e.	Exhibition	73	60.83	39	32.50	8	6.67	2.54	IV
f.	Discussion meeting	97	80.83	16	13.33	7	5.83	2.75	I

Adoption of supportive facts

Support services were adopted less by respondents. Crop insurance (mean score = 1.25) ranked 1st, followed by institutional credit/loan facility, Govt. incentive for vegetable cultivation, and Weather-related advisory with a mean scores of 1.22 and 1.00 ranked 2nd and 3rd in the adoption of aspects of supportive facts, respectively (Table 6,Figure 6). When the forests were cleared for farming, the civilized races who practiced agriculture engaged in a never-ending war with the original inhabitants who did not practice agriculture (14).

Table 6. Adoption of supportive facts/ services in off-season vegetable growing (n = 120)

Sl. No.	Statement	Fully adopted		Partially adopted		Not adopted		Mean	Rank
		f	%	f	%	f	%		
a.	Crop insurance	15	12.5	0	0.00	105	87.5	1.25	I
b.	Govt. incentive for vegetable cultivation	0	0.00	0	0.00	120	100	1.00	III
c.	Institutional credit / loan facility	13	10.83	0	0.00	107	89.17	1.22	II
d.	Weather related advisory	0		0	0.00	120	100	1.00	III

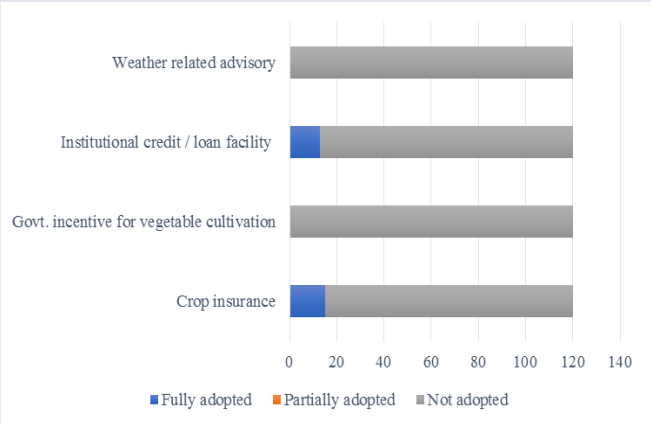

Figure 6. Adoption of supportive facts/ services in off-season vegetable growing

Categorization of respondents based on overall adoption

Based on different aspects, it was found that 56.67% (majority) of farmers had medium, 22.50% high, and 20.83% low adoption levels of off-season vegetable growing (Table 7), which shows the requirement for more scientific research to properly describe and characterize the promising agricultural legacy systems (15).

Table 7. Categorisation of respondents on the basis of overall adoption of off-season vegetable growing (n = 120)

Sl. No	Category	Frequency (f)	Percentage (%)
1.0	Low adoption < (Mean ± 1/2 S.D.)	25	20.83
2.0	Medium adoption = (Mean ± 1/2 S.D.)	68	56.67
3.0	High adoption > (Mean ± 1/2 S.D.)	27	22.50

Mean= 2.50 S.D. = 0.10 ***S.D.**: Standard Deviation

Conclusion

Regarding conservation measures, it was found that all (100.00%) respondents follow the practice of slope ploughing, followed by soil and moisture conservation, compared to mulching and genome conservation. All the respondents follow crop rotation whereas they are less aware of INM. In the aspect of market and marketing knowledge, the respondents have good knowledge of input availability place (mean score = 2.87) followed by profit maximization (2.83) and market information (2.73), while being less aware of marketing channel (mean score = 1.67, post-harvest grading and packing (mean score = 1.42), and storage facility (mean score = 1.30). In the case of supportive facts, the farmers have a good response regarding crop insurance (mean score = 1.33) followed by institutional credit/loan facility (mean score = 1.22) while they are lagging with respect to using the weather-related advisory (mean score = 1.00. Overall adoption of different aspects indicated that 56.67% (majority) respondents have medium, 22.50% have high and 20.83% have low adoption levels for off-season vegetable growing. So, there is a need for training regarding new market channels and methods, along with time-to-time weather advisory data.

The dissemination of novel, tested, and practical methods for growing vegetables should take place through a variety of extension initiatives to hasten their adoption. Simultaneously, cold storage and suitable marketing channels are to be developed for quick disposal of their produce and fetching a remunerative price for their produce, which can ultimately fulfil SDG 8.

Acknowledgements

The authors are extremely grateful to the informants and farmers of the Koraput district for their assistance and cooperation during data collection. Dwity Sundar Rout would like to acknowledge Dr. Radhashyam Panigrahi for his technical help.

Authors' contributions

GWB conducted field visits and data collection. DSR was involved in the drafting of the manuscript and approval of the final manuscript. AN performed the design of the research analysis. SKM analyzed the data.

Compliance with ethical standards

Conflict of interest: The authors declare that they have no competing interests.

Ethical issues: None.

References

1. Dash D. A review on organic farming as a potential sector of agripreneurship development among the tribal youth of India. Inter JAgri Env Biotech. 2018;11(5):761-67. https://doi.org/10.30954/0974-1712.10.2018.8
2. Gireesan K. Youth in agriculture: Opportunities, challenges and the way forward in the post-COVID-19 scenario. IAHRW Inter J Soc Sci Rev. 2020;8(7-9):321-29.
3. Dass A, Patnaik US, Sudhishri S, Choudhury PR. Vegetable cultivation: A major intervention for tribal watershed development. Ind J Soil Conser. 2002;30(3):240-47.
4. Parichita P, Mohapatra AKB, Rath BS, Tripathy P, Nanda A. Rainfall and temperature characterisation of Eastern Ghat highland zone of Odisha for potential cultivation of off-season vegetables. Phar Innov. 2023;12(1):2703-10.
5. Kar G, Sahoo N, Kumar A, Das M, Roychoudhury S, Chandra D. Integrated technologies to enhance productivity of seasonal deep waterlogged area. Water Technology Centre for Eastern Region, (ICAR), Bhubaneswar, Orissa, India. 2007;Research Bulletin 40. Available from: http://www.iiwm.res.in/pdf/Bulletin_40.pdf
6. Glover DJ. Increasing the benefits to smallholders from contract farming: Problems for farmers' organizations and policy makers. World Dev. 1987;15(4):441-48. https://doi.org/10.1016/0305-750X(87)90112-4
7. Bindhani BK. Status and problems of educational scenario among the tribals in Koraput district, Odisha. The Orien Anthrop. 2021;21(1):158-63. https://doi.org/10.1177/0972558X21990627
8. Raja, P, Khare NK, Singh SRK, Khan MA. Constraints perceived by tribal farmers in adoption of recommended practices. Ind J Exten Edu. 2014;50(3 and 4):65-68.
9. Rogers EM. New product adoption and diffusion. J Con Res. 1976;2(4):290-301. https://doi.org/10.1086/208642
10. Maharana J, Acharya P, Das A, Jakhar P. Participatory variety evaluation and influencing factors appraisal for offseason cabbage cultivation on rainfed uplands of Odisha. Veg Sci. 2015;42(1):38-43.
11. Sivakumar PS, Nedunchezhiyan M, Paramaguru S, Ray RC. Production system-specific differences in farmers' demand for greater yam (*Dioscorea alata*) varietal attributes in Orissa state, India. Exp Agr. 2009;45(4):469-82. https://doi.org/10.1017/S0014479709990433
12. Kalyani M. Structure, policy and prospects of rural industrialization in Orissa (India): A strategic approach for sustainable development. J Manag Pub Pol. 2011;2(2):70-98.
13. Jena SK, Parida JK. Retail marketing of the vegetable growers of Koraput district–A case study of Semiliguda block. Ind Hortic. 2002;03:1-20.
14. Lal P. The tribal man in India: A study in the ecology of the primitive communities. In: Mani MS, editor. Ecology and biogeography in India. Dordrecht: Springer; 1974. p. 281-329. https://doi.org/10.1007/978-94-010-2331-3_11
15. Singh AK, Rana R. Nationally important agricultural heritage systems in India: need for characterization and scientific validation. Proc Ind Natl Sci Acad. 2019;85(1):229-46.