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Agricultural Diversification and its Impact on Income and Employment of the Farmers: A Review

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ABSTRACT

Commercial crop diversity is currently an important approach for increasing agricultural profitability and reducing the risk of crop failure. Diversification can also be used to aid in poverty reduction, employment planning and environmental conservation. Growing a variety of crops does not guarantee increased returns, though it may help to stabilise them. Diversification leads to profit maximisation by taking use of complementary relationships. Agricultural diversification has been stressed at the national level as a strategy for increasing income and creating employment. Many countries have tried crop diversification to increase productivity and cultivate high value crops in order to address the challenges of a globalising agricultural market as well as the expanding and changing requirements of the people, with favourable results. These countries are gradually diversifying their crop sectors in favour of high-value items including fruits, vegetables and spices. Here, we review this under three main sections: the impact of agricultural diversification on farm income, the impact of agricultural diversification on employment and the factors influencing the implementation of crop diversification.

Key words: Diversification, Employment, High value crops, Income, Risk management.

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Farmers in the developing countries who grow cash crops diversify their agricultural production systems to enhance their revenues, improve and maintain food security and minimise poverty risk (Kanyua *et al*., 2013; Schroth and Ruf, 2013; Mulwa *et al*., 2017). Indian agriculture is predominantly a small peasant based economy with approximately 86% of the operational holdings being below two hectares but own just 47.3% of the crop area (Agriculture Census 2015-16). Agriculture performs a critical function in India's economic system. 54.6% of the population is engaged in agriculture and allied activities (Census 2011). Because of small operational holdings, it's certainly very tough for small farmers to enhance their income only by raising the yields of the existing crops, mainly cereals. However, with the supply of current farm inputs in the current decades, it turned into viable for farmers to generate higher levels of income by introducing high value crops commonly known as cash crops in their farming units. A majority of smallholder farmers do more than one activity and create revenue from more than one source such as crop diversification, which refers to a diversity of agricultural systems rather than the shift from one specific enterprise to another (Abdullah *et al*., 2019). Diversification of agriculture toward high-value cash crops, such as fruits and vegetables, that are compatible with the region's comparative advantage is proposed as a viable solution to stabilise and raise farm incomes, increase employment opportunities for small and marginal farmers, boost exports and conserve and enhance the natural resource base, primarily land and water (Vyas, 1996; Chand, 1996; Joshi *et al*., 2004; Rao *et al*., 2006; Sharma, 2005).

When income rises, consumers' preferences move from staple food items to high value food items. Such a shift in consumption behaviour encourages farmers to diversify their crop portfolio and focus on high-value crops (Jha *et al.*, 2009). Joshi *et al.* (2004) and Birthal *et al.* (2007) examined that farmers have been encouraged to diversify into horticulture crops since yield growth has declined and prices for grains, pulses and oilseeds have fallen. Farmers will switch to the crops if they find the new one to be more profitable and/or less risky. Crop diversification is a practical tool for food and nutrition security, income generation, poverty eradication and employment creation at the macro level (Gunasena, 2001; World Bank, 1990).

Because high-value crops need more labour, may be able to provide stable employment and income to a large number of rural households who endure severe seasonal unemployment and underemployment in a mono-crop economy. Diversification to commercial crops has become an important approach for increasing agricultural earnings, reducing crop failure risks and above all, earn foreign exchange. Planned diversification increases both individual and social gains (Haque, 1996). This diversification

approach may be designed to assist to alleviate poverty, generate employment and preserve environment (Hayami and Otsuka, 1995). Diversification is a method for poverty reduction, job creation, environmental protection and augmentation of farm income through better use of available resources. Crop diversification is one of the tactics proposed as a means to poverty alleviation in agriculture (Birthal *et al.* 2006; FAO, 2011). Agricultural diversification is one of the most environmentally sustainable, cost effective and simple means of lessening the impact of uncertainty, particularly among smallscale farmers (Mugendi, 2013). Crop mixtures, according to the Nagaraja (1988) in Anantapur district, bring not only a larger monetary return but also additional employment chances. In a nutshell, the crop mixtures system aligns the goals of increasing employment while also increasing output. Kumar *et al*. (2012) revealed that the region's crop sector has been slowly transitioning towards high-value crops. There were also significant differences in agricultural diversity across different states in the region. The relevance of technology, modern implements, education and road connectivity are the significant factors of crop diversification towards high-value crops has been highlighted by the findings.

Impact of agricultural diversification on farm income

Agriculture diversification through fruits and vegetables, as well as other high-value non-foodgrain crops, appears to be the best option, as these commodities encourage the creation of creative supply chains and open up new avenues for increasing income, creating employment and encouraging exports Barghouti 2004; Pingali 2004. A significant positive association between crop diversification and farm income was found by Perz (2004). Davis *et al*. (2012) revealed that diversified cropping systems produced equivalent or even better yields than simplified systems while having fewer negative environmental consequences. Crop variety and farm revenue have a considerable beneficial relationship, according to research by Makate *et al*. (2016) in Zimbabwe. Devi and Prasher (2018) in Himachal Pradesh revealed that, the growth performance of vegetable crops is improving as compared to cereals and pulses. Cropping patterns have shifted in favour of high-value cash crops and crops that are essential for food security and increase the farmer's income. Agricultural diversification through vegetable crops, according to Oberai and Raina (1991), has a great potential for income generation in Western-Himalayan region. Mithiya *et al.* (2018) articulated that crop diversification is one of the most effective risk management and income generation strategies for the farmers. Crop diversification is highly beneficial in enhancing farm household income as well as nutritional security, according to a recent study in Malawi by Mango *et al.* (2018).

Huang *et al*. (2009) found that the rise of fruit production in China provided a favourable opportunity for lower-income households and for less educated households with elder members (who are also poorer in China) to increase their incomes. Birthal *et al.* (2013) also suggested that diversification toward fruits and vegetables, according to the study, could result in greater net earnings for small farmers in India (without significant increase in variability) and as a result, a favourable influence on poverty reduction. Joshi *et al*. (2004) analysed the diversification of agriculture in South Asian countries in high value commodities such as fruits, vegetables, livestock and fisheries and found that fruits were eight times more profitable than cereals and livestock activities had the potential to increase small holder farmers' income in rural areas of India. Mithiya *et al.* (2018) used farm-level data from West Bengal and assessed the influence of horticulture diversification on farm income and employment. The findings clearly showed that horticulture production is more profitable and labor intensive than cereals and pul ses cultivation *i.e* the gross return is substantially higher in horticulture cultivation per hectare than in cereals and pulses cultivation. Horticulture cultivation also has lot of job opportunities as compared to others. Therefore, it fits well in the small farm production systems.

Thapa *et al.* (2018) estimated that in Nepal, households cultivating high-value crops such as vegetables, fruits, spices or condiments had 28 per cent higher average monthly per capita expenditure than non-growing agricultural households, while high-value crop producers had 9 per cent lower headcount ratio than non-growers. Mukherjee (2015), discovered that in West Bengal, India, aggregate per capita net earnings from cultivation of high-value crops were lower in more diversified villages and that farmers in these areas ended up with significantly less income than farmers in less diversified villages. Immink and Alarcon (1991) found that diversification into high-value crops (potatoes, wheat, vegetables) had both good and negative effects on farmers' income in Guatemala, depending on farm size. They found 7.8, 23 and 15.6 per cent gain in overall revenue for farmers that diversified from maize to potatoes, wheat and vegetables respectively. However, they also observed 9% decrease in overall income for small farmers with less than 1.5 hectares that switched from maize to potatoes. Mittal and Hariharan (2016) studied crop diversification trends and drivers of crop diversification in India's various agro-climatic zones. They discovered that agricultural diversity, when combined with sustainable intensification, increased agricultural productivity, reduced risks and increased market participation and incomes for the poor, resulting in poverty reduction and climate resilience. They further revealed that diversification helped to achieve sustainable intensification by lowering mono cropping and boosting multiple cropping, as well as reducing pest and disease risk and enhancing system resilience. According to Van and Maertens (2016), horticulture production for the export market can boost the income purchasing power of contract farmers and workers in the export chain.

Impact of agricultural diversification on employment

In Himachal Pradesh, Chand (1996) studied agricultural diversification through high-value crops and found that

diversification modified cropping patterns and enhanced farmer's income and employment. Diversification with horticulture, according to Prasad *et al*. (1996), is viable within agriculture with relatively little investment and has the potential to provide higher income and employment of farms. Sharma (2000) analyzed that diversification accelerated to accomplish the goals of increased income, more employment, income stability and natural resource conservation. Singh *et al*. (2001), in Haryana found that higher levels of employment were found in potato, sugarcane, cotton, wheat, rice, bajra and maize, while intermediate levels of employment were found in pulses and oilseeds. The impact of crop diversification on farm income and employment was studied using secondary data at the household level for the state of Uttar Pradesh by Joshi *et al.* (2006). The study's findings demonstrated that small farmers had an advantage over large farmers in terms of labour supply from family sources, allowing them to cultivate vegetables and other labor-intensive crops with ease. Crop diversification also boosts farm efficiency, increases labour productivity, optimises resource utilisation and protects soil fertility (Ashfaq *et al*., 2008; Mehta, 2009; Mukherjee, 2012). Crop diversification also provides greater employment and revenue options for small and marginal farmers throughout the year (Chand, 1999). According to Ryan and Spencer (2001) crop diversification connects the farm and non-farm sectors, promoting both forward and backward linkages, resulting in a varied range of high-value agri-based products and employment possibilities.

Saini *et al*. (1998) demonstrated that in Himachal Pradesh, diversification of arable farming systems with milch animals, poultry and floriculture played a significant influence in increasing agricultural income and employment despite a poor land base and surplus human labour. They proposed that, in order to assist small farmers in reaping the benefits of diversified plans, financial institutions should provide adequate credit on easy terms, allowing small farmers to break free from the vicious cycle of poverty and the chronic problem of unemployment/underemployment of family labour on these farms in the study area in particular, as well as in hilly areas of the country. Singh *et al*. (2001) revealed that agricultural diversification through horticulture crops, vegetables and commercial crops offers a large potential for employment and income generation on various farms in Uttar Pradesh's Farrukhabad. Due to its labor-intensive character, vegetable production was more beneficial for marginal and smallholdings, where family labour availability per unit of land was higher in comparison to large farm holdings. The findings of Bala and Sharma (2005) indicated that vegetable crops have nearly fully replaced traditional cereal crops. The cropping intensity has increased due to the prevalence of relatively short-term vegetable crops in the cropping pattern. Because vegetable crops need a lot of labour, they have created more employment opportunities in villages. Agricultural income per farm has climbed by 33.20 per cent over the same time period, according to the data. As a result, the farming community's overall standard of living has been judged to be improved. According to Birthal *et al*. (2006), diversification toward high-value crops has a significant potential to accelerate agricultural growth and increase income and employment opportunities for the small farmers.

Factors influencing the implementation of crop diversification

Several studies have identified a number of factors that influence crop diversity. Labor, occupation, irrigation, road density and market facility all have a substantial impact on agricultural diversification in India's North Eastern region (Birthal and Joshi, 2006). Landholding, farmer's age, educational level, agricultural experience, off-farm income, farm distance from main road, farm distance from main market and farm size were the factors affecting crop diversification (Ashfaq *et al*., 2008). Crop diversity is heavily influenced by agronomic parameters such as landholding size, fertiliser quantities, tillage time and tillage (using a plough), as well as distance to the market (Kiru *et al*., 2014). The nature and extent of crop diversification at the household level was influenced by factors such as farm size, family size, access to institutional credit, access to extension services, type of tenancy, irrigation facilities, experience of the farm household head and so on, according to a review of previous studies. However, location-specific agro-climatic factors such as level of rural infrastructure development, relative profitability of different crops, per capita income of consumers, availability of production technologies and government policies toward agricultural trade, subsidy and procurement system are all major determinants of crop diversification at the aggregate level (Joshi *et al*, 2004; Vyas, 1996; Gupta and Tewari, 1985; Anosike and Coughenour, 1990; Pope and Presscott, 1980). The gender of the household head, education, number of livestock units, access to irrigation, membership in a farmers group, access to markets, farming experience, flat-land farms, farmer-to-farm extension, routine extension, agro ecological zone and household income all played a significant role in increasing crop diversification (Dube and Guveya, 2016).

Lack of availability to inputs such as fertilisers is one of the potential barriers for agricultural households in the production of their crops (Xu, 2009). Access to fertiliser influenced households' decisions to diversify crops in a significant way, with the likelihood of crop diversification increasing by roughly 44% for those households with access to fertiliser. Fertilizer is arguably one of the most important inputs for crop productivity. Kumar and Gupta (2015) also discovered a positive link between irrigation access and crop diversification. Irrigation, according to Zimmerer (2014), can promote agricultural diversity by allowing crops with varied maturation phases to be farmed by extending the growing season. Mukherjee (2015) discovered a strong positive relationship between irrigation and crop diversity in India, which was related to consumption and net income. Author

also observed that small farmers (<0.5 ha and 0.5-1 ha) in locations with difficult conditions to establish irrigation infrastructure were more likely to cultivate fruits, oilseeds, jute and fibres to meet their monetary demands than those in districts with irrigation facilities, according to this author. The level of crop variety is found to be positively related to the education of the household head Rehima *et al*. (2013). According to Summer and Wolf (2002), having a significant amount of farmed land boosts your chances of diversifying your agricultural systems. The results showed that holding size has a positive relationship with diversification (Entropy Index) and that increasing holding size promotes diversification. Diversification is more common among large farmers than among small and medium farmers, owing to the fact that large farmers have more land resources to distribute among diverse crops and devote more attention to farming than any other off-farm activity. Adjimoti *et al*. (2017) found out that larger land holdings were linked to reduced diversity in Benin, owing to the fact that big farm size proprietors preferred to diversify into high-value crops and subsequently specialise on them (*e.g*., cashew cultivation).

To uncover the drivers of crop diversification Devi and Prasher (2018) used the stepwise linear regression method and discovered that average land holding size, regulated market infrastructure and irrigated area were the most important determinants, all of which were positively connected to crop diversification. Agriculture diversification was an option for farmers in Himachal Pradesh to stabilise and increase farm incomes. Muhammad *et al*. (2008) showed that the size of land holding, age of respondents, education level of respondents, farming experience of respondents, off farm income of respondents, distance of farm from main road, distance of farm from main market and farm machinery were shown to be the most important factors affecting diversification. Devi *et al.* (2020) found lack of irrigation facilities, small land holdings, fluctuating prices, far-flung markets, wild animal threats, disease and insect pest attacks and irregular monsoon were identified as impending challenges that endanger the economic viability and ecological sustainability of crop diversification in Himachal Pradesh. According to Jha *et al.* (2009) explored the factors that affect agricultural diversification at different stages in the Kurukshetra area of Haryana, India. According to the regression analysis, rising road density and urbanisation boost agriculture commercialization and with commercialization, farms in a region specialise in specific crops and crop groups based on resource, infrastructure and institutions of the region. Birthal *et al*. (2013) assumed that the adoption of perishable high-value crops was thought to be positively associated to the density of paved roads in India, however better road density led to livestock diversification (dairy, fishery, poultry) instead.

CONCLUSION

This review concludes that most studies report a very strong positive contribution of crop diversification towards the high value cash crops on income and employment level of the farmers. There was uncertain contribution of the diversification into high value crops to food security and nutrition. However, there were some major determinants to crop diversification like location specific agro-climatic factors, level of rural infrastructure development, relative profitability from different crops, land holding size of the farmers, age, educational level, farming experience of the farmers, off-farm income and access to irrigation.

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