

UNCERTAINTIES IN THE INTRODUCTION OF NEW CROPS - A CASE STUDY OF GRAPE CULTIVATION IN KARNATAKA

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ABSTRACT

Crop diversification towards high value crops seems to be a solution for problems at two levels; at macro level, it helps to rejuvenate agriculture sector and at micro level, it augments the income of small farmers and generates employment. However, introducing new crop, particularly high value crops, involves several production and market related uncertainties. This study attempted to analyse these uncertainties at a micro level with special emphasis on small landholders in grape cultivation. Further, the study presents the mechanism adopted by the farmers to mitigate above-mentioned uncertainties, when it is left to them with the absence of an institutional mechanism to handle. A mechanism adopted by the farmers to mitigate these uncertainties was repetitive exchanges. The study reveals that farmers who engaged in repetitive exchange were exposed to lesser variability.

Keywords: Crop Diversification, Small Farmers, Uncertainties, National Horticulture Mission, Repetitive Exchanges.

Introduction

The shift towards high-value crops, particularly by small landholders, seems to have occupied the centre stage of academic discourses in the recent times. The aim to increase the overall agricultural productivity and farm level income of the producers has been a vital factor in triggering this major shift. There have been policy

initiatives at the national level, like the National Horticulture Mission, 2005, encouraging cultivation of high-value crops like horticultural crops. There is a wide range of literature on such diversification presenting various opinions on its viability and sustainability of small farmers shifting towards high-value crops. One set of studies infer that the cultivation of high-value crops are apt

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for small landholders owing to availability of plentiful family labour (Birthal, Jha and Singh 2007). This inference is further supported by a study by Birthal, Jha and Singh (2007) which reveals about the higher participation of small holders in production of horticultural crops like vegetables and fruits. They establish an eight-fold time higher relative profitability in cultivation of fruits than in cereals (Joshi, Gulati, Birthal and Tewari 2004). However, the process of diversification towards high-value crops is not widespread as expected by the policymakers. Another set of literature presents an argument saying that the diversification process involves a cost, which has to be taken care of by the agents. Though the high-value crop cultivation is viable and profitable, the agents incur certain costs in the process of transition. The high-value crops like fruits and vegetables involve high price and yield uncertainties, which needs to be addressed to smoothen the diversification process (Joshi, Gulati, Birthal and Tewari 2004). As Dev (2009) argues, the small landholders might not shift to high-value crops unless they are hedged for the uncertainties involved in the cultivation of high-value crops by appropriate institutional arrangement. Though, initially the farmers shift towards high-value crops mainly due to higher expected incomes, the sustainability of the crop diversification is contestable without addressing uncertainties faced by them. The district-wise study conducted by Haque et.al (2010) in Bihar, Odisha, Uttar Pradesh, Jharkhand and West Bengal furnishes some interesting facts about diversification. In some of the districts in

Jharkhand and Uttar Pradesh, the marginal and small farmers recorded low participation in the process of diversification when compared with medium and large farmers. This implies that the shift towards horticultural crops has not been a smooth transformation for small landholders, with their relatively small production surplus, weak asset-base and poor bargaining power, which expose them to higher risk and uncertainties (Joshi, Gulati and Cummings JR 2007). However, there are successful cases in India where the establishment of an appropriate institutional arrangement led to active participation of small and marginal farmers in the diversification process. Introduction of Virginia Tobacco cultivation in Guntur district and the Green Revolution in certain pockets of the country are two such examples. Both, the private company in the first case and the State in the latter case, succeeded in mitigating the information, price and yield related uncertainties involved in the task of diversification.

With the given background, this paper attempts to review two successful diversifications and tries to analyse three types of uncertainties; namely, information, yield and price related, involved in the third case being the National Horticulture Mission, with special emphasis on small and marginal farmers. It also presents the nature of mechanisms adopted by the grape-cultivating farmers, at the village level in *Devanahalli* taluk, which is located in Bangalore Rural District, to mitigate price and market uncertainties in the absence of an institutional mechanism.

Uncertainties and Institutional Intervention: Two Successful Cases of Crop Diversification in India

Uncertainty is a typical characteristic of agriculture sector owing to the nature of it. Agriculture is exposed to wide variety of fluctuations (like rainfall) which can alter the output in agriculture for the given inputs in an unpredictable pattern (Timmer 2009; Moschini and Hennessy 2001). The investment decision by a farmer has to be undertaken much before the expected amount of produce and price realised for the produce. The decisions are intertwined with many uncertainties in the process of production and expectation of the price. The uncertainties can be broadly classified into production uncertainties, price uncertainties, and market uncertainties with additional uncertainties like technology and policy uncertainties (Moschini and Hennessy, 2001). Thus, the agents look for an institutional mechanism to minimise these uncertainties. North (1990) defines institutions as *"the humanly devised constraints that structure political, economic and social interaction. They consist of both informal constraints (sanctions, taboos, customs, traditions, and codes of conduct), and formal rules (constitutions, laws, property rights)."* He further argues that, *"Throughout history, institutions have been devised by human beings to create order and reduce uncertainty in exchange."* Hence, institutions constitute the framework where human interactions take place. Given the above proposition, this section presents two successful cases of agricultural diversification in India and also looks at how the

various uncertainties were handled through formal institutional mechanism in the cases and this can provide some insights on the role of institutions in facilitating the present case of diversification.

This section reviews the cases of tobacco cultivation in Guntur district of Andhra Pradesh and the Green Revolution in several parts of the country in 1960s, while unraveling the uncertainties that prevailed in terms of production, price and marketing. This section will highlight the role of institutions that were instrumental in addressing these uncertainties.

Tobacco Cultivation in Guntur District : The tobacco cultivation in Guntur district in 1920s represent the case of a private company called British-American Tobacco Company (BAT) which aimed at promoting the cultivation of Virginia tobacco in India¹. Experiments for the conducive area to cultivate this crop concluded Guntur district as one such option with low production costs and a large prevalence of labour supply. Tobacco cultivation was familiar to farmers in this region, as it was cultivated by large and medium size farmers. However, the cultivation of Virginia tobacco, a new variety of tobacco required a different method of cultivation.

The company invested a huge sum for setting up demonstration camps to equip the farmers with adequate information on the new variety of tobacco cultivation. This step was taken by the company to address the knowledge uncertainty that can hinder the participation of farmers, particularly small and marginal farmers,

in the diversification. This effort taken by the company assured the small farmers of the benefits and returns from the cultivation of Virginia tobacco and encouraged the widespread participation of the farmers in this process.

To ensure a wider participation of small farmers², BAT invested on provision of necessary inputs (which include new seedlings and fertilisers), finance options and training programmes for equipping farmers with the mechanism of Flue-curing Virginia (FCV). The company shared the costs of roofing, flues and coal to erect barns. This resulted in a drastic increase in area under tobacco cultivation in Guntur district between the periods 1922 to 1923 from 225 to 750 acres (Duvvury 1986).

The company along with the Indian Leaf Tobacco Development Corporation Ltd (ILTD) announced a price which can ensure the farmer of the cost of inputs and realise higher profits in comparison to traditional crop. This step by the company aimed at mitigating uncertainties related to price and assured a higher return for the small farmers in the cultivation process.

In a general scenario, market risk emanates because of asymmetry in the information between farmers and intermediaries about the price and demand for the crop. This asymmetry can become depressive and unsteady for farmers (Duvvury 1986). As area under tobacco expanded, ILTD could not sustain direct contractual relationship with farmers and as a result intermediaries meddled in the chain resulting in unregulated markets. However, after

agitations led by the farmers³, the State stepped in to establish an open auction market with participation of only intermediaries with sufficient capital. In this manner, the government along with Tobacco Stabilisation Company (TSC) fixed a minimum price and bore the burden of market volatile fluctuations to ensure fixed returns for the small and marginal farmers in Guntur district.

Green Revolution: Green Revolution represents another successful case of crop diversification in India owing to its significant breakthrough in Indian agriculture initiated by the State. The State played a crucial role in spreading information about the adoption of high-yielding variety seeds and new method of cultivation. It induced many small farmers into the diversification process in the late 1960s across several States of India. States were selected on the basis of water resources, other institutional aspects like developed cooperation and *Panchayats* which can yield maximum potential for production employing the new method of cultivation (Krishna 1971). This new technology based on the seeds imported from Mexico and Philippines were ensured to be adaptive to Indian agro-climatic conditions. To deal with uncertainties related to production techniques specifically with respect to new method of cultivation, State invested immensely on "Farmer Training and Education Scheme" in some eighty districts across India⁴. As in the previous case, State played a key role in promoting various channels for financing and extended short-term and long-term loans to the farmers. The

nationalisation of banks in 1969 along with establishment of rural cooperative societies addressed the credit needs of farmers in this process of cultivation (Krishna, 1971).

Ford Foundation suggested the State to guarantee a minimum support price to the farmers for selected crops. This resulted in establishment of Commission for Agriculture Costs and Prices (CACP), which guaranteed the minimum prices to the farmers and addressed the uncertainties related to prices (Shroff and Kajale, 2012).

One of the striking features of the Green Revolution period is the establishment of regulated markets for procuring the produce from the farmer. The regulated market is a responsible institution which discharged all the functions connected with the sale of the output by balancing the interests of cultivating farmers, intermediaries and consumers (Kumar 2013). The farmers brought their produce to market yards created by the government. The licensed traders, intermediaries negotiated with the buyers (who were also retailers) and sold the produce obtained from cultivators in an open auction. This in turn assured a market for cultivators and the unsold produce was purchased by the government to maintain the buffer stock. Such institutional intervention warranted the widespread participation of small and marginal farmers by diminishing the uncertainties associated with the marketing process.

In contrast, the third case, National Horticulture Mission (2005), which is a major

policy initiation by the Government of India to encourage farmers, particularly small and marginal, to cultivate high-value crops like horticultural crops seems left behind in establishing adequate institutional mechanism to handle uncertainties involved in the diversification. With that proposition, this paper attempts to analyse uncertainties involved in the case of grape cultivation in Karnataka.

Methodology

For the primary data, grape cultivation at Devanahalli taluk of Bangalore Rural District in Karnataka has been selected for the study. The three reasons why this particular region and crop was chosen are: First, Karnataka is the second largest grape producing state, in which Bangalore Rural District contributes around 13 per cent to the total grape production in the State. Further, Devanahalli taluk produces around 50 per cent of the district's grape production (Directorate of Economics and Statistics 2013). Second, there is a decrease in the area under traditional crops like Mulberry and Ragi in Karnataka in the last decade indicating a diversification to horticultural crops. Third, 77 per cent of landholders in Karnataka are marginal and small farmers, who possess around 40 per cent of operating land. In Bangalore Rural District alone, around 90 per cent of landholders are marginal and small farmers.

For the study, seven villages in Devanahalli taluk were selected randomly. Personal interviews of around 51 grape cultivating farmers with pre-designed questionnaire were conducted. The sample consisted of small,

medium and large farmers with a composition of 24, 20 and 7 households, respectively in the total sample survey. The data presented in the study were collected for the year 2013.

The standard deviation and mean are calculated, though an unsophisticated⁵ method to do so, with an implicit assumption that the standard deviation captures the variability, which can be an index of output and price uncertainty.

National Horticulture Mission Scheme: A Case of Crop Diversification in Devanahalli

As argued hitherto, there has been policy initiations to promote horticultural crops like grapes, particularly to encourage marginal and small farmers to take part, across the country. Respectively, National Horticulture Mission (NHM) was introduced in 2005 as a holistic approach to promote *“horticulture sector through an area based regionally differentiated strategies which include research, technology promotion, extension, post-harvest management, processing and marketing, in consonance with comparative advantage of each State/region and its diverse agro-climatic feature”*⁶. Given that, this section attempts to analyse uncertainties involved in the introduction of new horticultural crop based on the findings of a case study conducted through village survey in Devanahalli taluk of Bangalore district, Karnataka. In contrast to the two cases presented in the previous sections, this case, which is a product of National Horticulture Mission scheme, highlights a new set of problems faced by the farmers, which aggravates due to the peculiar nature of the crop. Although there is a successful case of tobacco cultivation undertaken

by a private company, it is important to look at this case in comparison to Green Revolution as both are State-led schemes and which was promoted in suitable regions throughout the country.

The notable difference between Green Revolution and the present case is the nature of the crop introduced. Green Revolution entirely focused on food crops like wheat and rice, whereas NHM intended to promote horticultural crops, which involves more risk and uncertainties. They are highly vulnerable to climate changes, requires high initial investments, prior knowledge on method of cultivation, high fertilisers, proper post-harvest management and marketing. Therefore, it requires more attention and planned implementation in every aspect of the scheme to make it a successful case. Given the nature of the crop, the introduction of new horticultural crop involves several production and market related uncertainties. However, this section attempts to analyse uncertainties only related to knowledge, output and prices with special emphasis on land class-wise differences of the same.

Knowledge Uncertainties: : Knowledge uncertainties defined here as basically the lack of or incomplete information on method of cultivation and input usage during the introduction of new crop. The foremost thing for a farmer to introduce a crop is to know a method of cultivation and usage of inputs. The lack of information on these could be a significant barrier to the adoption of new varieties of crops (Foster and Rosenzweig, 1995). Acquiring knowledge

about a new crop plays a crucial role in shifting from traditional crop to new crop. In the previous two cases, both the private company and State played an important role in spreading knowledge on new varieties of crops and methods of cultivation by organising demonstrative and training camps. This initiation in both the cases paved the way for successful implementation of a new crop.

The NSSO Report (2003) reveals contrasting facts about farmers' access to information on various inputs. A large proportion, as high as 60 per cent were ignorant about any information on modern technologies of cultivation. In fact, the major source of information was "other progressive farmers" on which 17 per cent farmers relied upon. Only 2 per cent of the sample households were equipped with fertiliser testing facility and a meagre 18 per cent were aware of bio-fertilisers. A similar experience unfolded in the field analysis, where grape cultivators relied upon the "other farmers" for information on method of cultivation and usage of fertilisers. The newcomers into grape cultivation have to bank on other experienced farmers in the same or in neighbouring villages. Every time the farmer comes across a problem or doubt like how to deal with the particular disease, type of insecticide or pesticide to be used and directions on usage, he consults other farmers for suggestion. Most of the grape cultivators keep visiting other farms to update themselves on what others are doing, what new methods they have adopted or problems they are facing by which they all keep the track of new change. The solution from other farmers may not work all the time as

they are also not formally trained on grape cultivation, things might go wrong at times and lose entire crop because of someone's mistake or ignorance. The "trial and error" is a common practice to equip them with the method of cultivation and information on grading while quality of grapes was obtained only by experience. And information on medication for any disease or low yield, the farmers had to rely solely on intermediaries and agri-business agents. In the complete absence of formal extension services, farmers bore the uncertainties involved in it.

Output Uncertainties: Output uncertainties are defined as variations in yield per acre for given inputs. The variability in yield per acre can be due to changes in several variables like climatic changes, lack of timely supply of inputs and lack of adequate information on cultivation method. However, the degree of uncertainty might differ depending upon the nature of the crop. Similarly, it is an attempt to analyse the comparison of yield variability, both at State and village level, between food and horticultural crop with the implicit assumption that both the crops had favourable conditions for cultivation. The two crops- Grapes and Ragi- are chosen as a proxy for each group for the comparison. Grape crop is selected as a proxy for horticultural crops and Ragi as a proxy for traditional crops because it is a major food crop in the region. For these two crops, the mean and standard deviation of the average yield per acre for the period⁷ between 1996 and 2011 is calculated as an estimate for output fluctuations.

To make sure that Karnataka is not an outlier to compare Grapes with Ragi, as the data

are from secondary sources, it is shown that the average yield per acre between India and Karnataka are comparable. The mean value of yield per acre for grape crop for India is 9.19 whereas for Karnataka it is 8.52, which is close to

all-India mean value. Similarly, the value of standard deviation 2.18 is almost close in comparison to all-India value, which is 2.23. This implies that Karnataka is not an outlier State in comparison to India.

Table 1: Mean and Standard Deviation of Yield Per Acre of Grape and Ragi in Karnataka, for the Period 1996 to 2011

Karnataka, Grape yield/acre (in tonnes)		Karnataka, Ragi yield/acre (in tonnes)	
Mean	8.52	Mean	1.61
Standard Deviation	2.23	Standard Deviation	0.30

Source: Calculated by the author using data from the Directorate of Economics and Statistics.

Table 1 presents a State level comparison of mean and standard deviation value of yield per acre of grape and ragi. The yield mean value for ragi and grape is 1.61 and 8.52, respectively. This huge difference in value could be attributed to a difference in the nature of the crop. Similarly, the value of standard deviation for ragi is 0.30, whereas for grapes it is 2.23. The significant difference in this value presents an approximate index of yield instability of horticulture crops in comparison to traditional crops, implying higher output uncertainty of horticultural crop with given inputs. The farmers are exposed to more risk compared to any traditional crops with this high uncertainty.

Assuming a similar difference in yield variability of both the crops at village level, it is interesting to know which landholding class is more exposed or worse off in the cultivation of horticulture crops like grape. For the same, according to land owning, the sample size has been classified into three classes; small, medium and large farmers. Table 2⁸ presents the mean

and standard deviation values of yield per acre of grapes for all the landholding classes. The mean value of yield per acre of grapes for all the classes is 6.77, which is less than the average yield per acre of grape at State level. One possible reason for lesser yield among sample households, in comparison to State and all-India could be because of the recent entry⁹ of sample households into grape cultivation. However, the value of standard deviation for all classes is 2.97, which is more than for all-India and Karnataka. This implies that the yield variability is more at village level.

The mean value for small farmers is 6.64, contrary to large farmers, which is 10.64. There is a huge difference in average yield per acre between these two broad groups, indicating worse off situation of small farmers. On the other hand, the value of standard deviation for small, medium and large farmers is 2.66, 2.46, and 2.21 respectively, showing the higher value for small farmers. It clearly designates that as the size of landholdings increases, the value of standard

deviation of yield per acre decreases. This implies that the yield variability within small farmers is very high among all sizes of landholdings, indicating more exposure to uncertainties. This could act as a disincentive for small farmers to shift towards a high value crop like grapes, posing a serious question in the Indian context as marginal and small farmers constitute a large proportion among the total number of cultivators in India.

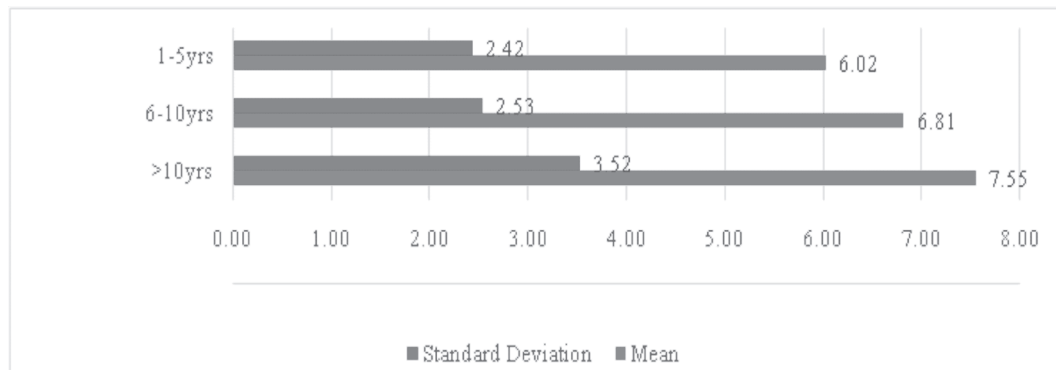
Table 2: Mean and Standard Deviation of Yield Per Acre for Grape Crop across Landholding Class, for Sample Households in 2012

Farmer Size	Total	Production	Mean	Standard Deviation
Small	24	159.5	6.64	2.66
Medium	20	111.5	5.58	2.46
Large	7	77.5	10.64	2.21
Total	51	345.5	6.77	2.97

However, as estimated by Foster and Rosenzweig (1995), the experience of farmers and learning from fellow farmers influences the productivity and profitability. They argue that as the farmers gain knowledge on cultivation, by self and from other farmers, over a period of time the productivity increases leading to high profits. On similar lines, the sample is classified into three groups based on the number of years of cultivation, and calculated mean and standard deviation for grape yield to capture the changes in yield as the number of years in cultivation increases (Figure 1). As the number of years in cultivation increases from five to more than ten years, the average yield per acre increases from 6 to 7.55 tonnes, respectively. Interestingly on

the other hand, the standard deviation also increases from 2.42 to 3.52 in the same period, implying that there is high variability in yield within the farmers. An inference we can draw from this is that as farmers' experience increases, the uncertainties in the method of cultivation and input usage decreases, which is a typical case of "learning by doing". However, learning from other farmers seems to be limited or the spillover of knowledge is not significant as there is high variability in yield among themselves. The lack of cooperation within the farmer community pushes for a need of an institutional mechanism to bring them all under a single platform to acquire and share knowledge on cultivation.

Figure 1: Mean and Standard Deviation of Yield Per Acre for Grape Crop for Sample Households in 2012



Price Uncertainties: One of the significant features of earlier cases is that the price was ensured, by both the company and the State, for farmers which led to widespread participation in diversification towards new variety of crops. The sustainability of crop diversification to high value crops is promised on the stabilisation of prices. Obviously, the farmers expect to realise prices with certain margin of profit for the output they produced. The field experience with grape cultivators in Devanahalli exposes certain price¹⁰ uncertainties faced by them at village level. The price uncertainties here is defined at two levels; firstly, the difference between price proposed by the intermediary and the price realised by the farmers and secondly, the variability of realized price across the landholding classes. The landholding class-wise analysis illustrates which class of farmers are more exposed to price uncertainties.

The field survey indicates that, around 55 per cent of the grape cultivators failed to realise

the price which was promised by the intermediary to pay for the output sold. In which 75 per cent of them are small farmers, indicating small farmers are worst affected. On the other hand, all the medium and large farmers realised the promised price, implying that these farmers are able to dominate and survive in the existing system.

Another significant finding among the grape cultivators is the variability in difference between promised and realised prices. Table 3 presents the mean and standard deviation of difference between promised and realised prices for all the landholding sizes. The mean and standard deviation of total households is -1.52 and 1.99, respectively. On an average, around ₹ 1.5 per kilogram is paid less against the promised price. On the other hand, the significant value of standard deviation shows high variability in the difference across the cultivators. In other words, the price spread across the cultivators is not uniform and certainly there is a class which is

more affected. This argument is substantiated from the below results. An average price difference among the small farmers is -2.31 implying worst sufferers in the system. Similarly, the variability within the small farmers is very high, which is 2.21, followed by the medium farmers with 1.61. On the other hand, the large farmers are not at all affected by the price variation, with the value of zero for both mean and standard deviation.

Table 3: Mean and Standard Deviation of Difference Between Promised and Realised Prices of Sample Households.

Landholding	Mean	Standard deviation
Small	-2.31	2.21
Medium	-1.1	1.61
Large	0	0
Total	-1.52	1.99

This gives a clear indication that the small landholding farmers are worst affected against medium and large farmers in price uncertainties involved in grape cultivation. The medium and large farmers are able to realise the promised price from the intermediaries and sustain in grape cultivation. This significant difference across the landholding classes poses several questions on the nature of output selling arrangements prevailing and its functionality among the grape cultivators in the region.

The Contractual Arrangements Among the Grape Cultivators

The major marketing channel accessible for grape cultivators is through intermediaries. Around 98 per cent of surveyed households are dependent on intermediaries to sell their produce. Due to peculiar nature of grape crop, the harvesting requires large number of semi-skilled labour at a time which is supplied by the

intermediaries, which increases the dependency of farmers on them. Interestingly, there are no formal contracts between cultivators and intermediaries. However, 55 per cent of farmers practise spot contracts¹¹ and remaining 45 per cent practise oral contracts¹² with intermediaries, which are informal in nature. This high dependency on intermediaries leads to certain problems for the cultivators. The price uncertainties explained previously are the product of these arrangements. After the output is sold to intermediaries, the price promised to pay is not guaranteed by any means to the cultivator, but by just an oral promise. And usually, the time lag taken for the amount to be paid varies from one to six months. Therefore, the entire arrangement survives on the 'trust' and obligation between cultivators and intermediaries. The stronger the relationship between them, more chance to realise the promised price.

Repetitive Exchanges: A way out to Minimize Price Uncertainties : One of the common practices that strengthens the relationship between cultivators and intermediaries is their repetitive exchanges¹³. The argument that will unfold further in the following section is about how repetitive exchanges play a crucial role in constructing the 'trust' between the cultivators and intermediaries.

The role of 'trust' becomes an important social capital which minimises the problem of 'moral hazard' by the exploitative intermediaries. In the absence of formal institutional support (in terms of legal), 'trust' as a social capital addresses the missing link between the cultivator and the intermediary. This factor is enhanced with repetitive exchanges between them. Table 4 substantiates this argument. The sample is

classified into three groups based on the number of years of cultivation and calculated mean and standard deviation of difference between promised and realised price. In view of that, as the number of years in cultivation increases, the value of mean and standard deviation decreases. In the table, the Mean value of difference between promised and realised price decreases from 3.11 in first five years to 0.1 for more than ten years. Similarly, the value of standard deviation decrease from 2.04 to 0.3 for the same period. This change in value of mean and standard deviation over a period of time indicates that as the farmers get established in the field of grape cultivation, they are able to build that 'trust' with intermediaries and solve the problem of moral hazard in the system, which acts as a major factor in realising the promised price. But, does this 'trust' entail to the farmers of all classes?

Table 4: Mean and Standard Deviation of Difference Between Promised and Realised Prices of Sample Households with Respect to Number of Years of Cultivation.

	1-5 yrs	6-10 yrs	>10 yrs
Mean	3.11	0.88	0.10
Standard Deviation	2.04	0.99	0.30

The field experience provides certain intriguing observations. Around 51 per cent of surveyed farmers practise non-repetitive exchanges, whereas the remaining 49 per cent fall under repetitive exchanges (Table 4). Interestingly, 75 per cent of small farmers fall under non-repetitive exchanges. The large number of small farmers are in non-repetitive exchanges with intermediaries, which can be

explained by the following two reasons; firstly, because of the recent entry of these farmers into grape cultivation, as it takes time to establish themselves in the grape cultivation and build a relationship with the intermediaries. Secondly, as Singh (2005) argues, small farmers are excluded from the contractual system because of their relatively small market surplus.

Table 4-1: Number of Non-Repetitive and Repetitive Exchanges and Default Payments among Sample Households in 2012

Farmer Size	Total	NR	NR (%)	Defaults	R	R (%)	Defaults
Small	24	18	75	13	6	25	2
Medium	20	8	40	5	12	60	2
Large	7	0	0	0	7	100	0
Total	51	26	51		25	49	

Note: NR= Non-Repetitive, R= Repetitive Exchanges.

Table 4 indicates 82 per cent of payment default cases¹⁴ that fall under non-repetitive exchanges and only 18 per cent under repetitive exchange category. The Table also indicates that there are no default cases among the medium and large farmers. As the landholding increases, the repetitive exchange increases. More the repetitive exchanges, lower the chance of default and vice versa gives a correlation between repetitive exchanges and payment defaults.

Table 5 presents the difference between the realised and the promised prices (which captures the uncertainties faced by farmers in prices), as it clearly indicates that mean value of difference between the realised and the promised prices is higher in the case of non-repetitive exchanges, and as the previous Table indicates, 75 per cent of small farmers engage in non-repetitive transactions exposing them to higher uncertainties in terms of price for the grapes cultivated in the year 2012.

Table 5: Mean and Standard Deviation of Difference Between Realised and Promised Prices under Two Categories

Non-Repetitive		Repetitive	
Mean	2.90	Mean	0.08
Standard Deviation	1.94	Standard Deviation	0.28

Table 6 presents a class-wise distribution of the variability in difference between the realised and the promised prices. The small farmers with the largest share in the non-repetitive exchanges experience the highest difference between the realised and the promised prices. The mean value of difference between realised and promised price for marginal farmers is as high as ₹ 3.02 (per kg)

indicating that 75 per cent of total small farmers (under non-repetitive exchange) are exposed to price uncertainties. Whereas under the repetitive exchange, the mean value of difference is almost negligible that comprises the large and medium farmers (Table 6).

This being the case, what about the small farmers in repetitive exchanges? The exposure

to variations of price among small farmers in repetitive exchange is 0.40, which is lesser than 2.10 (in case of non-repetitive exchanges). However, it is still not equivalent to the case of large farmers who are completely shielded from

uncertainties. The large farmers face almost no mean difference in the value of realised and promised price and also experience zero variability in the price.

Table 6: Class wise Distribution of the Variability in Difference between Actual and Quoted Prices

Farmer Size	Total	NR (%)	R (%)	NR Mean	R Mean	NR St.D	R St.D
Small	24	75	25	-3.02	-0.16	2.10	0.40
Medium	20	40	60	-2.62	-0.08	1.59	0.28
Large	7	0	100		0	0	0
Total	51						

Note: NR= Non-repetitive, R=Repetitive.

Hence, repetitive exchange certainly plays a vital role in reducing the variability in prices faced by the small farmers, but this composition is almost negligible in comparison to large farmers. The very late entry of small farmers in crop diversification coupled with possibilities of lower market surplus puts them in an inferior position and they are mostly excluded from such informal practices of mitigating the uncertainties. It further substantiates the dismal state of small farmers who find it difficult to sustain the shift to high-value crops in the context of escalating uncertainties with respect to output, price and marketing. Given these unfavourable conditions existing for small landholders, at the policy level, it will be interesting to know what induces them to shift towards high-value crop like grape.

Shift to Grape Cultivation: From a Sample Household Perception : There is a significant shift by small farmers towards grape cultivation

in the last 6 years (Table 7). Overall, about 51 per cent of sample cultivators shifted in the last 6 years, in which 33 per cent are small farmers. If we consider the last 10 years, with the launch of National Horticulture Mission in 2005, the shift has occurred with almost 61 per cent of cultivators.

Most of the high-value commodities are capital-intensive, which require large-scale initial investment. The field survey notes that the average initial investment for grape cultivation is rupees four lakh per acre (6550 US dollars per acre). Around 75 per cent of marginal, small and semi-medium size famers are bestowed with access to formal credit and were provided loans for the initial investment by the commercial and co-operative banks. According to the opinions of the surveyed farmers, access to formal credit played an important role for the shift towards cultivation of grapes.

Table 7: The Sample Households' Perception on Incentives to Cultivate Grapes: The Share of Households for Each Incentive

Farmer Size	Only High Profits	High Profits & Govt. Subsidies	Other Farmers Cultivating	Other
Small	16.7	70.8	8.3	4.2
Medium	40	55	5	0
Large	71.5	28.5	0	0
Total	33	59	6	2

The profit rate and subsidies provided by the Central and State government are the major incentives for the farmers to shift to grape cultivation. Around 70.8 per cent of small farmers shifted to grape cultivation because of high profit rate and also due to government subsidies (Table 7). Whereas, for the 71.5 per cent of large farmers, the high profit rate is the only motivation for the shift in cultivation. Surprisingly, 8.3 per cent of small farmers shifted because of other farmers who started cultivating grapes and making high profits, without prior knowledge of production techniques and market facilities. Probably, what we can infer from the field data is that the profit rate and credit accessibility are the two important driving forces for the shift. The study conducted by Deepak Shah (2007) in (*Niphad taluq*) of Nasik district, Maharashtra, concluded with the same inference that the high profit was the major incentive to shift towards grape cultivation in those regions.

Conclusion

With due consideration of scope and benefits, both at the economic and the individual level, from crop diversification towards high-value crops, this paper tries to analyse certain

uncertainties involved in the process and how these uncertainties were handled in previous cases and left for farmers to handle them in the present case. The paper attempts to make an argument that, unaddressed uncertainties could be a major constraint for farmers, particularly marginal and small farmers to shift towards high-value crops. As presented in the study, the farmers have no access to the knowledge of method of cultivation and mostly depend on 'trial and error' method or on the fellow farmers. Given the nature of the crop and its vulnerability to changes in inputs, farmers are highly dependent on intermediaries and agro-business agents for advice on input usage. Consequently, the farmers become vulnerable when they are unable to sell their output and realise the expected price. The exploitative intermediaries were the source of information on prices and the only major marketing channel for the farmers. The huge sunk cost in grape cultivation put farmers in a 'hold up' situation¹⁵ as the contractual relationship between farmers and intermediaries lies informal. In most of the cases, the farmers were paid less than the promised prices, wherein the payment never takes place on the spot after harvesting.

The policy-induced (NHM) shift towards high-value crop like grape, unlike the Green Revolution's case, left farmers to handle the uncertainties related to production and marketing all by themselves. The case of NHM presents very contrasting results (at least at the village level) in comparison to previous cases of crop diversification, where the industry and the State played a significant role in handling uncertainties involved in the process.

The field study explains the presence of repetitive exchange as an alternative informal mechanism to address the uncertainties, while engaging with intermediaries. Grape cultivators invested time in building trust with intermediaries and this helped them in getting better information on prices and providing an

effective channel for marketing. The study reveals that farmers who engaged in repetitive exchange were exposed to lesser variability between the actual and quoted price. However, unfortunately, it was only 25 per cent of small farmers who were involved in repetitive exchanges. Thus, even the informal mechanism was not in favour of small and marginal farmers.

This paper concludes with the reflection that the purpose of the policy initiation appears to have failed in fulfilling the existing mechanism to handle uncertainties. Agreeing with Dev (2008), "*diversification has increased risk for farmers as there is no supporting system for farmers*"; there seems to be no shift towards high-value crops as expected and whatever shift has taken place might not sustain in the long run.

Notes

- ¹ The huge market for this tobacco and lack of an adequate substitute in the native domain of BAT pushed the idea of production of tobacco leaf in India. Subsidiary of BAT called Peninsular Tobacco Company (PTC) established manufacturing units in Munger and Bangalore.
- ² Production of a new crop exposes the farmers to uncertainties with respect to inputs or credit. The small and marginal farmers are vulnerable to access for credit needs, input requirements and methods to cultivate a new crop. This hinders the participation of them in crop diversification.
- ³ Dependency on intermediaries exposed farmers to uncertainties in terms of marketing and price for the produce. As a result, the farmers led several agitations in the district.
- ⁴ This training scheme played a vital role in extending information related to the new seeds and techniques of cultivation. This step by the State ensured participation of small farmers who were equipped with the knowledge of new production techniques.
- ⁵ Coefficient of Variation (CV) would have been a better measurement, but in this paper it is avoided because in some cases as mean tends towards zero, the CV approaches infinity and doesn't make sense.
- ⁶ See National Horticulture Board official document.

- ⁷ The data on grapes are not available for previous years.
- ⁸ One time data presented is for the year 2012.
- ⁹ About 51 per cent of sample cultivators shifted in the last 6 years, in which 33 per cent are small farmers.
- ¹⁰ The price of grape output analysed is for the year 2012.
- ¹¹ The spot contracts are unwritten contracts between farmer and intermediary, but with no guarantee of procurement of produce every year by the same intermediary, which is not a long-term business relationship between farmer and intermediary.
- ¹² Oral contracts are which without any written agreement between farmer and intermediary, but there is a business relationship between farmer and intermediary on which a farmer believes that the intermediary would purchase whole produce every year at a reasonable price.
- ¹³ By this, we mean that if the period of exchange between farmer and intermediary is more than three years, in the sense, the contractual relationship between these two is more than a span of three years, we define that as an act of repetitive exchange. Whereas, if this period of exchange is less than three years, it is a case of non-repetitive exchange.
- ¹⁴ Default cases are defined as a situation where intermediaries have not paid the total amount completely or partially to the cultivator.
- ¹⁵ The farmers cannot switch to other crops without incurring loss.

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