

Anil Kumar

**CHALLENGES IN ADOPTING MODERN FARMING
PRACTICES BY RESOURCE POOR FARMERS:
A CASE OF EASTERN UTTAR PRADESH**

Agricultural sector in India is growing to fulfill the need of food, nutrition and micronutrients for human being as well as for animals to maintain ecosystem. It is the largest sector to engage human resources as unskilled agricultural labour and developing scope of livelihood are marginal, small and even for landless community through diversifying farming practices. The study has been conducted with respect to the families, engaged in farming for primary or secondary source of income. The study cover the issues of field farming techniques in the Nepal's bordering district of Shrawasti, Eastern Uttar Pradesh, especially on cropping pattern, intensity and cost benefit ratio, farming practices and limitations in adaptation of modern agriculture. Findings revealed that low cropping intensity, slow adoption of new farming technologies, poor market linkage are the major limitations in fragile ecosystem particularly in the flood prone and low land context of district Shrawasti. The paper also deals with possible opportunities in the area for the elevation of standard of living and resources of the poor farmers and other stakeholders of Eastern Uttar Pradesh.

The agriculture sector in the Eastern Uttar Pradesh has declined over the last two decades causing serious threats to the livelihoods and food securities of those who are, directly and indirectly, dependent on farming. The agriculture and allied sector is contributing to the sustainable growth and development of the Indian economy. This sector fulfills the demand of food and nutritional requirements of 1.3 billion Indians and also contributes through production, employment and linkages with the other nations. Since the beginning of economic reforms in 1991, growth in agricultural GDP has shown high volatility. It has fluctuated from 4.8% per annum in the Eighth Five Year Plan (1992-96) to a low of 2.4 % during the Tenth Plan (2002-06) before rising to 4.1% in the Eleventh Plan (2007-12) it dipped at 1.6% during first 4 years of Twelfth Plan and lately at 2.1% in 2017-18. (GOI, 2016; The Economic Times, 2016, 2018).

The share of agriculture and allied sector in UP's Gross State Domestic Product (GSDP) has dipped from 29.7% as of 2004-05 to 21.9% as of 2012-13

ANIL KUMAR, Assistant Professor, Department of Sociology, STJM PG College, Bilhaur, Kanpur,
E-mail: anil.aina@gmail.com

(ASSOCHAM 2015). The growth of GSDP at constant (2011-12) prices for the year 2014-15, 2015-16 and 2016-17 is estimated to be 4.0%, 8.0% and 7.4% respectively" (GoUP, 2017). "Agriculture plays a vital role in India's economy. Over 58 per cent of the rural households depend on agriculture as their principal means of livelihood. The share of primary sectors (including agriculture, livestock, forestry and fishery) is estimated to be 20.4 per cent of the Gross Value Added (GVA) during 2016-17 at current prices. GVA from the sector is estimated to have grown at 3 per cent in FY18" (IBEF, 2018).

Uttar Pradesh is known for growth and contribution in agriculture and allied sector in India as well as in the world, but farmers are being marginalised day by day, due to small holdings of land, less availability of technical input, from experts, lack of capital and of awareness of the government programmes on part of farmers. State has 16.49% of the country population (U.P. population 19.95 crores, 2011 census) with 225 lakhs farmers' families.

There are more than 18 million agricultural households in Uttar Pradesh and around 59 % of its workforce was dependent on agriculture based livelihood in 2011. Marginal (< 1 ha) and small (1 – 2 ha) farmers cultivate 92.5 % of all landholdings in UP which accounts for 64.8% of the total area cultivated in UP (Verma, Gulati, and Hussain 2017). The 'average monthly income per agricultural household is the third lowest in Uttar Pradesh i.e. Rs. 4701, where as Bihar and West Bengal are lower than UP (Agricultural Statistics at a Glance, 2015), portraying a grim state of UP's farmers. In UP, marginal (< 1 ha) and small (1–2 ha) farmers cultivate 92.5 percent of all landholdings in the state which accounts for 64.8 percent of UP's total area of landholdings. The average size of landholding in UP in 2010-11 was about 0.76 ha' (All-India Report on Agriculture Census 2010-11, & 2015; Verma , Gulati , and Hussain 2017:5).

Uttar Pradesh has favourable and suitable climate, vast areas of fertile soils, sunshine and adequate water resources. Cropping intensity has gone up in Uttar Pradesh from 149.4% to 157.53% over the last decade representing intensification of agricultural land and input use (Agriculture Statistics of UP 2017; Verma, Gulati, and Hussain 2017:8). The major area under lowland and flood prone area is located in eastern part of Uttar Pradesh, covering 15 districts which constitute about 30% area of total Rice cultivated in the state. As regards the favourable irrigated area it is more than 50%, while upland and very deep water and flood prone areas are restricted to 10% and 4% only in the state (Dwivedi 2012: 10).

Purpose of the Study

The present study has been conducted to analyse the dynamics of the agriculture in Uttar Pradesh and more specifically in the selected villages of the Gilaula block of the district Shrawasti, Eastern Uttar Pradesh. The scope of the study is to understand the adoption of modern agricultural practices

including cropping pattern, intensity, cost benefit ratio and other agriculture practices as well as to analyse the socio-cultural and ecological factors influencing farming and life of farmers in the area. The main focus of the study is to suggest the appropriate and acceptable farming techniques and to enhance the socio-economic status of the farmers to improve their agriculture based livelihoods.

Methodology

This study is cross-sectional and has adopted primary as well as secondary sources to understand the agriculture practices and limitations in the Shrawasti district in the Eastern Uttar Pradesh. For primary data, the researcher has adopted both qualitative methods such as focus group discussion (FGD) and participatory rural appraisal (PRA) with farmers and quantitative (Household Interview and Value Chain Analysis) methods to obtain information from marginal and small farmers from three revenue villages of Gilaula block of Shrawasti district. Selection of villages was as per norms of representative sampling included the topographical and socio-economic structure of the district. Proportionate random sampling was used for the selection of the small and marginal farmers. Interviews were conducted with the farmers either at their homes or at field. The quantitative data was filled in Excel Sheet with the help of data dictionary prepared for household schedule and village profile. Data of 150 farmers was analysed with the technical support of SPSS 12.00. The land holdings are very small and fragmented in the district as well as in the Eastern Uttar Pradesh; therefore it was decided to set acre as a denominator rather than hectare for the study.

Background of the Area

The Context

The study was conducted amongst the poorest and most backward regions in the country. The economy of the region is predominantly agrarian in nature and the agriculture and allied sectors still happen to be the primary source of employment. 'The size of land holding is also very small. Nearly 82% of the farmers possess holding size less than 1 ha (0.39ha) and 12% farmers hold in between 1-2 ha (1.41 ha) land. Irrigation status of agricultural land in eastern U.P. indicates that about 40% of net sown area is *rainfed* and remaining (60%) is irrigated, out of which only 18% of area is fully irrigated. The major area of the region is occupied by rice-wheat cropping system having the cropping intensity of 150%. The eastern U.P. contributes about 30% of total food grain production of the state'. (Tripathi HP, Kumar Alok . 2010: 05). Major Kharif crops grown in the district are rice, maize and arhar (pigeon pea). Major Rabi crops are wheat, lentil and mustard. Sugarcane is the main cash crop of the district. Mentha is also emerging as a cash crop. The livestock

sector of the district comprises of 64334 cows, 108383 buffaloes, 95340 sheep/goats and 203622 poultry birds. (C-DAP, 2013: i).

Population of the area lacks quality education and skill development opportunities, hence unemployment is increasing among landless and marginal farmers and female members of these families. It is commonly accepted and well documented that agriculture has developed more rapidly in Western part of Uttar Pradesh and has become much more productive than agriculture in the rest of the state [Stokes E 1978; Patnaik and Hasan 1995:85; Lerche Jens. 1998: A-30]. The main reason for this seems to lie in the social fabric of the area. East UP has, historically, been dominated by landlords, whereas in West UP, middle and large peasants are more predominant than anywhere else in the state. (Lerche 1998: A-30).

Declining soil health in the region is suffering from persistent erosion so far as their organic (living) contents are concerned. Agriculture in the region is also highly vulnerable to the vagaries of nature- droughts as well as floods. In fact floods are a perennial problem here. Over the last two decades, the agriculture sector has witnessed a trend of increasingly low 'return on investment' from agricultural operations due to ever increasing cost of inputs (particularly, the costs of irrigation, fertilizer and labour) and stagnating output values. The infrastructure facilities like transportation, electricity, health, nutrition and education, etc. are highly inadequate in the area. It is more challenging when support system for agriculture is poor in this region like credit, input supplies, post production value addition and processing, storage, marketing and extension facilities are in a very poor shape in eastern Uttar Pradesh. (GDS. 2011).

Social Demography

The socio-cultural relations in the society also reflect the economic and agriculture system. Agriculture was a peculiarly important and esteemed branch of activity, not only to the landlord, but also to the farmer in the eighteenth century (Weber 1930). Karl Marx (1867) predicted that capitalism would develop within agriculture following the same pattern as witnessed in industry. The system would be based on feudalism, with capitalist tenant farmers and proletarian workers of the land. In the new sociology of agriculture, different interpretations of Marx's theory were launched. (Hilde Bjorkhaug 2012:284). Since most of the North Indian villages have feudalistic mode of production, it results the hierarchical structure of the society. 'The feudal production relations characterised by large landowners exploiting small farmers and landless labourers through narrowly-specified rigid contractual arrangements have often been considered to be the root cause of sluggishness in agricultural performance in the region' (Ballabh and Pandey 2009: A-15). The caste and land were the cultural capital of the agrarian society in traditional India. The political economy of the agrarian society has been

transformed due to decline of land as a primary source of power and other dominance, influenced by the development interventions of the state machinery (Gupta and Thakur 2017, Das, 2017: 222). The rural power structure has changed from land to 'education' and 'public sector jobs' to 'multinational jobs' and 'entrepreneurship' in neo-liberal economy. (Gupta and Thakur, 2017). The positive impact of land reform followed by redistribution of land among landless families can be measured. In addition such change also impacted by modern farming practices transformed their socio-cultural life. The farmers of the villages are traditionally engaged in cultivation of paddy, wheat and lentils. Most of the farming families belonging to the lower castes i.e. SCs, OBCs are engaged in agriculture based activities for livelihood.

Patriarchy is one of the characteristics of the feudalistic mode of production in the agrarian society; hence most of the families (around 95%) of the sample villages are headed by the male member of the family and only 5% families are headed by the women. Tasks that women usually perform are not recognized as work, their labour could be perceived more as exploited (Andersson 2017:91).

Shrawasti is one of the districts located in Nepal borders of Uttar Pradesh. The district has 1117361 persons out of which 189334 (16.4%) belong to SC and 5534 (0.5%) STs. (PCA, Census 2011). There are 332 families residing in the 3 hamlets of the 3 revenue villages namely Lalpur, Imilia Narayan and Bishunapur of Gilaula block. Out of these 322 families around 64% of the families believe in Hindu religion and around 36% believe in Islam. Most of the families of the study villages belong to OBC 59.94% and general caste 28.31% and rest of them are SCs 11.75% (Personal contact).

Land Use Pattern and Holding

The availability of per capita agricultural land has been decreasing rapidly everywhere in India including Eastern Uttar Pradesh. Total geographical area of the state is 24.17 million hectare (which is 7.33% of total area of India) out of which 16.81 million hectare is under cultivation constituting 70% of the total geographical area (Verma, Gulati, and Hussain 2017:3, ICAR). Gross cropped area of the Uttar Pradesh was 261.47 lakh ha during 2014-15 with the cropping intensity of 157.53% (Agriculture Statistics 2017). In Uttar Pradesh size of holding is around 0.83 ha and per capita land area is 0.14 ha, which is less than a half of the national average of 0.32 ha (IWMP 2009:9). The land use pattern of any region/country at any point of time is governed by the prevailing physical, economic and institutional framework. In other words the land use pattern in India keeps evolving as a result of action and interaction of various factors such as physical characteristics (productivity, location, geography, etc) of land, the institutional framework (social, legal, etc.) and the availability of resources (water, capital, labour, etc). (Chaturvedi, Patil and Goswami 2011: 169). Uttar Pradesh is

cultivating about 58% of its geographical area, while the figure for the whole country is 45%. Out of the total geographical area of 328.02 m ha of India and 29.44 m ha of UP, 17.02 m ha and 13.58 m ha area suffers from various kinds of degradation, respectively. (Ibid: 170). Net sown area of the district *Shrawasti* is 1.3 lakh ha, out of which 0.53 lakh ha is irrigated which is 41% of net sown area (C-DAP2013: i).

Chayanov argued with his *Theory of Peasant Economy* (1986) that farm production and size depended upon the farming families need for consumption. When farming was carried out for the family only, Chayanov claimed that factors like wages and economic surpluses were irrelevant. (Hilde 2012:286). The selected villages (3) have 424 acres land, out of which around 90 per cent is being used in farming and 10 per cent in housing, greenery and other common use of the villagers. There are a few ponds in the selected villages which are being used for seasonal fishery.

Due to ever increasing population pressures in Uttar Pradesh, the landholdings are getting increasingly marginalised and the vast majority of the landholdings have now become either marginal (≤ 1 ha) or small (1–2 ha). The Proportion of marginal and small farmers was 21.1% and 20.8% in 1971 and 36.97% and 24.28% in 2001 respectively (IWMP 2009:49). At present 92.5% of all landholdings of the stat can be put under either small or marginal category which accounts for 64.8 percent of UP's total area of landholdings (Verma, Gulati, and Hussain 2017:5). The fragmented nature of land holdings is another characteristic in the Uttar Pradesh. The landless families are increasing day by day, where 12.43% households in Uttar Pradesh and 8.77% in Shrawasti were landless during agriculture census 2001 (IWMP 2009:46). Around 18% households in the selected villages of Shrawasti were found landless. The study has been conducted with respect to the families, engaged in farming for primary or secondary source of income. Around 17% farmers have land <0.5 acre, where 33.33% farmers hold 0.5-1 acre of land, 20% have 1-2 acres, 6.67% have 2-3 acres of land and 23.33% have above 3 acres of land among the respondents of the selected villages in Shrawasti district. (Fig. 1).

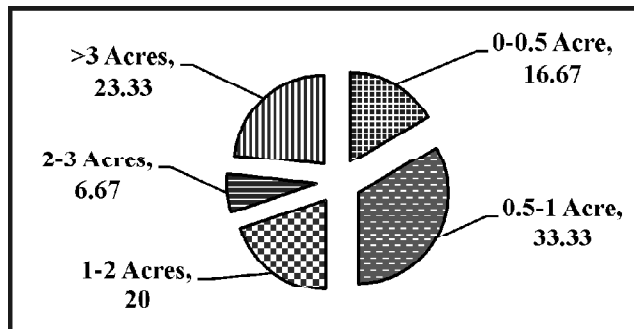


Figure 1: Land Holding with Farmers (%)

Existing Farming Practices

The agricultural growth experience of India since independence was essentially an outcome of the massive efforts aimed at ensuring availability and use of quality seeds, chemical fertilizers, irrigation, pesticides, farm machinery and equipment, agricultural credit, etc. 'Rice (*Oryza sativa* L.)-wheat (*Triticum aestivum* L) is the most important crop sequence in India, occupying 60-70% of the total cultivated area in eastern Uttar Pradesh. Wide adoption of this system is mainly due to stable production and less labour requirement.' (Kumar *et al.*, 2001:573-77; Tripathi, Kumar 2010:7).

Pre Sowing Practices

Land preparation is the basic need in modern agricultural practices. Most (80 %) of the farmers of the district Shrawasti depend on rented tractors in ploughing their lands, where 20% farmers prepare their land through bulls. Farmers have also started rotavator in preparation of land especially for wheat and vegetable crops. During Rabi season farmers plough their land 3-4 times.

After land preparation farmers sow seeds in their land to produce grains, vegetables and other eatables etc. Farmers use various sowing techniques as per requirement and acceptability of the technique among farmers of the area. Farmers use broadcasting 3.45%, line sowing 6.90% and transplanting 89.65% methods in Paddy sowing. In case of Maize, 85.71% farmers use the broadcasting technique and 14.29 % farmers adopt line sowing method. Farmers, who produce the pulses and oil crops adopt only broadcasting method. During Rabi season 96.55 % farmers adopt broadcasting method and only 3.45 % of them adopt line sowing method for Wheat (Fig. 2). For production of vegetables transplantation method exists in the study area.

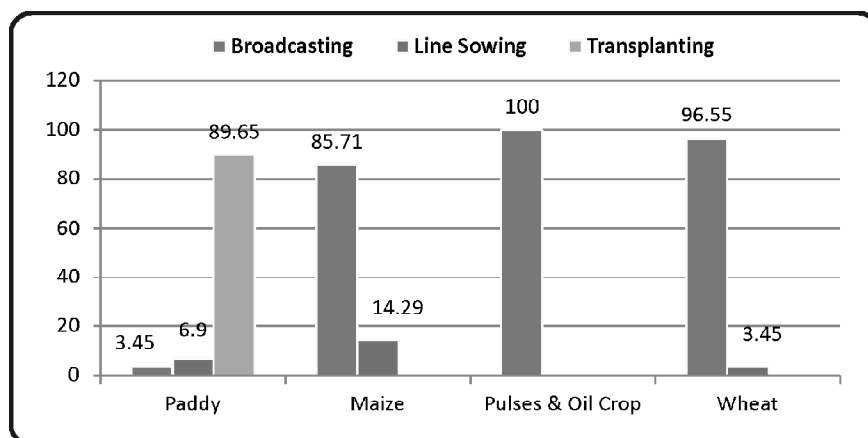


Figure 2: Sowing Techniques

Seed Replacement Status

Seed is considered the basic input for enhancing agricultural production and productivity. The estimated contribution of seeds in the productivity is considered to be 20- 25 per cent. Therefore, ensuring the availability of quality seeds for enabling farmers to achieve higher agricultural production is a strategic requirement (GOI 2016:67). Reliable source for improved variety of seed is a major problem for agriculture sector in India and more specifically in the Eastern Uttar Pradesh. The organized sector (including both private sector and public sector companies) accounts for about 30- 35 per cent of the total seeds distributed in the country. The unorganized sector, comprising mainly farm-saved seeds, accounts for the remaining portion (GOI 2016: 17). Shrawasti district of the Eastern Uttar Pradesh is one of the lowest priority districts. It is a result of poor socio-political & geographical condition; poor transportation facility (no rail connectivity to the district), due to which farmers getting less profit in agriculture. The farmers use seed from own source, other farmers or private shop etc.

In case of paddy and maize, private seed shop is the first choice of the farmers (79.31%) and (71.29%) respectively, whereas for pulses and oil seed crops, they prefer to take seed from their own source or from other farmers. Farmers go to private shop to purchase of hybrid or improved quality seed in all the cases i.e. Paddy, Maize, Arhar crops of the Kharif season. During Rabi season farmers prefer to take Wheat seed from private seed shop (50%) and own source or other farmers (50%). Farmers take seed for pulses and oil crops from own or other farmers. During Zaid season farmers take seed for pulses and vegetables, from own home.

Seed quality is maintained through seed certification, seed testing, seed labeling and seed law enforcement by the State Seed Certification Agencies, numbering 24 at present, functioning in various states (GOI 2016:68).

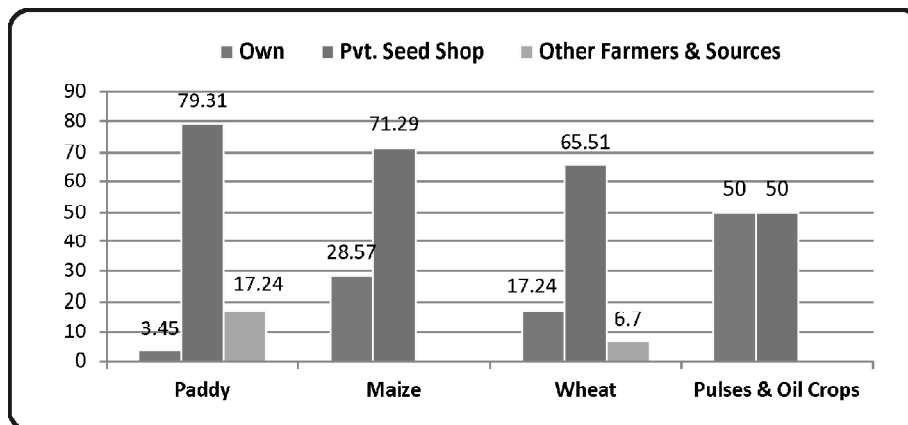


Figure 3: Seed Replacement Rate

Farmers of the Gilaula block of Shrawasti district use traditional, high yield variety and improved quality seed to get better production subject to their resource capacity. Farmers who produce paddy in their land prefer to use hybrid seed (62.07%), and improved quality seed (34.48%). Only 3.45% farmers of the area use traditional seed for paddy. In case of Maize crop, farmers use traditional (28.57%), improved (28.57%) and hybrid seed (42.86%). For pulses and oil crops, farmers prefer to use traditional seed (81.82%) and few of them use improved quality seed (18.18%). During Rabi season 13.79% farmers use traditional and 86.21% farmers use improved quality seed (Fig. 4). In Zaid season very less farmers engage their land for agriculture.

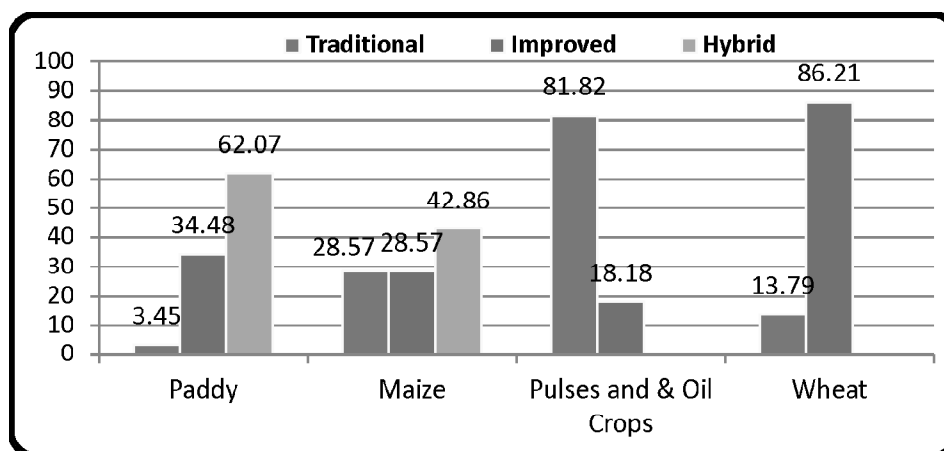


Figure 4: Varietal Replacement Rate

Irrigation System

Water is the most critical resource for agriculture, gaining primacy even over soil. Rainfed areas currently constitute 55% of the net sown area of the country and are home to two-thirds of livestock and 40% of human population. Even after realizing the full irrigation potential, about 50% of the cultivated area will remain rainfed (NRAA 2012: 3).

Districts of Eastern Uttar Pradesh are flood prone area of Gangetic plain of North India and Shrawasti is one of them. This part of the Uttar Pradesh naturally receives large amounts of rainfall for crop production as well as ground-water recharge. During rainy season 2-3 times water from Rapti River comes in the district and water stagnates in agriculture land for 7-10 days. Farmers incur a lot of expenditure in irrigation of their crop, because of less availability of canals (60) and government tube wells (303) and other low cost irrigation systems. All the farmers of the Shrawasti district are dependent on 9053733 private (own/rented) tube wells (Agriculture Statistics 2017), whereas farmers of the area also depend on tube wells/ground water

(110-120 feet deep boring) to irrigate their lands during Kharif (76.67%), Rabi (93.33%) and Zaid seasons (**Fig. 5**). In Kharif season, most of the farmers depend on monsoon or ground water to irrigate their crops and few farmers of the area lift water from drain/pond to irrigate their crops during this season.

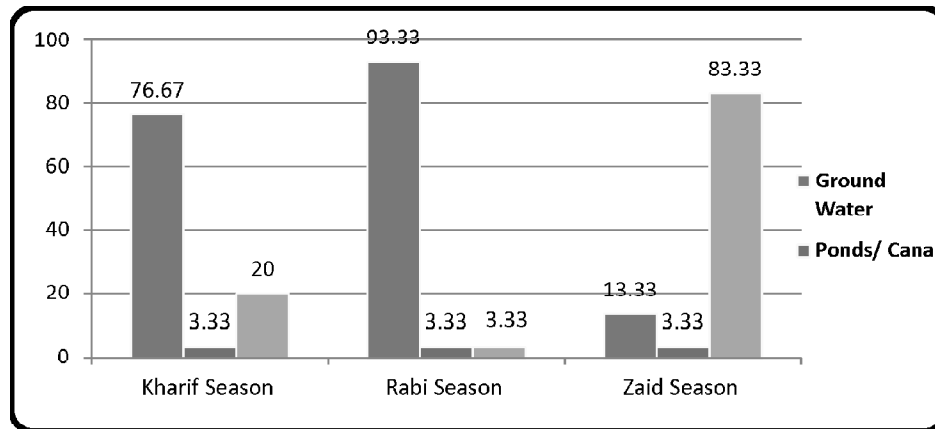


Figure 5: Irrigation System

Soil Nutrient Management

For promoting technological change and to sustain yield-based crop growth, substantial growth in fertiliser use is necessary. But fertiliser use is concentrated on relatively high responsive crops. (Mruthyunjaya and Kumar 1989: A-159). The use of chemical fertilizer in agriculture is increasing due to non-availability of compost or other form of organic fertilizers. This practice not only increases the input cost, but also degrades the fertility of soil. Most of them depend on chemical fertilizers, even if they use compost or other organic forms of fertilizers. Around 17% farmers purely depend on chemical fertilizer and around 83% depend on chemical with compost for production of paddy. In farming of Maize, farmers depend on chemical (42.86%) as well as chemical with compost (57.14%). In production of Pulses like Pigeon Pea and other kharif crops farmers use chemical fertilizers and some of them do not apply any form of fertilizer (**Fig. 6**).

During Rabi season farmers depend on chemical fertilizers as well as on compost and few of them on green manuring etc. For production of Wheat 62.07 % farmers depend on only chemical fertilizers and 34.48 % on chemical with compost. In pulses, oil seed crop and vegetable production, most of the farmers depend on chemical fertilizers. During Zaid cropping season, the situation does not differ from Kharif and Rabi seasons. The practice of green manuring in this area is needed to be increased to improve organic content in the soil.

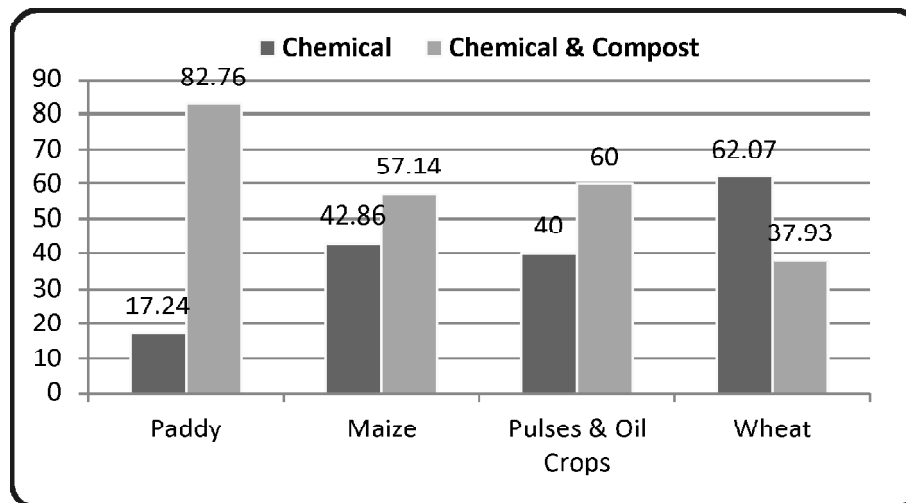


Figure 6: Soil Nutrient Management

Poor Adoption of Modern Plant Protection Measures

Problems are caused by weeds on primary industries and biodiversity conservation (both terrestrial and aquatic) as well as on communities, human health, infrastructure and culture. (Randall RP 2017). Weed management is a major problem in farming due to non availability new technologies to control the weed. They do not have the knowledge about and application of the conoweeder to control the weed in their crops. It is mostly seen in the area where most of the farmers adopt broadcasting method of sowing. This practice is also one of the causes for growth of weeds in the agriculture land. Farmers have to start Zero tilling, line sowing and summer ploughing practices to control weed and improve benefit ratio.

Farmers of Gilaula block in Shrawasti district, use manual method and weedicides to control the weeds in their fields. To control weed in Paddy crop around 69% farmers apply manual method and 31% use chemical weedicides to prevent weeds. Most of the farmers who produce Maize during Kharif season apply manual method (71.43%) and around 14% of them also use the weedicides and similar no. of farmers do not take action to prevent weed. Farmers of this region apply the technologies: manual (10.34 %), chemical weedicides (65.52%) and around 24% use nothing in pulses and oil crops. In the Rabi season farmers apply the techniques of manual (63.64%) but not other measurement in Wheat crop (Fig. 7).

Pests and diseases are also problem in the agriculture of the study area. Farmers adopt various methods to protect the crop from pests, insects and other diseases. Most of the farmers (50% in Paddy and 94 % in Wheat)

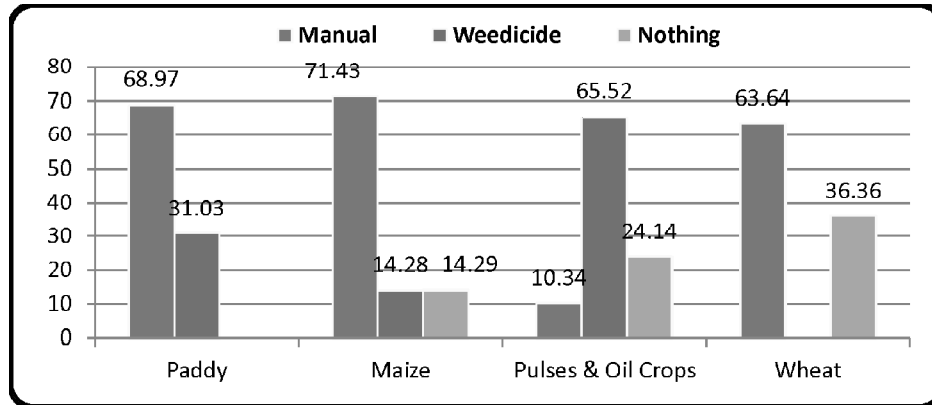


Figure 7: Weed Management

are not in practice of using chemical pesticides or other pest control mechanism in the district Shrawasti.

Adoption of Post Harvest Technologies

Farming sector is being mechanized day by day in the country, but it is slow in the Eastern Uttar Pradesh due to poor extension and transportation facility. Almost all farmers harvest their crops manually (about 83% in Paddy and 96.55 % in Wheat), while farmers using combine method in paddy are 17.24% and 3.45% in wheat harvesting (Fig. 8).

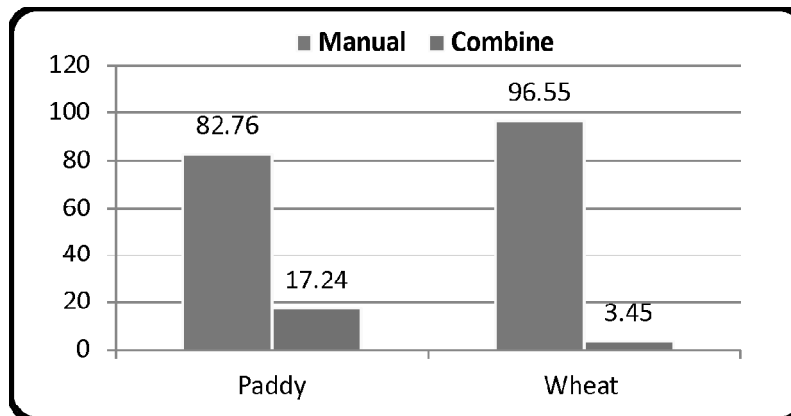


Figure 8: Harvesting Techniques

Threshing is one of the major components of the farming, which is also adapting new technologies of threshing the crops after harvesting from fields. For threshing of paddy, 17.24% farmers using bulls/manual method, 41.38% use a thresher/machine, 17.24% use a combine method and 20.69%

adopt both (machine and manual) methods. In case of Wheat, about all the farmers use thresher except 3.45 per cent farmers use combined methods in threshing of the wheat. For Maize, pulses and oil crops, farmers use manual method in the area (Fig. 9).

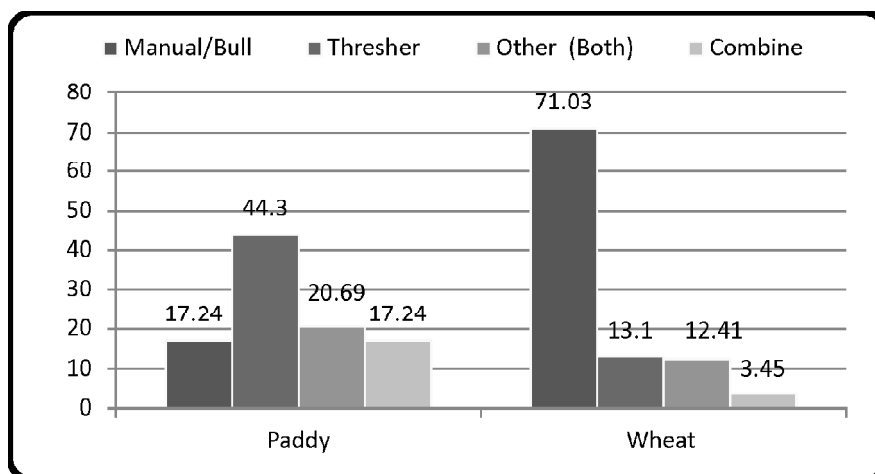


Figure 9: Post Harvesting Techniques

Farmers store and keep their agriculture produce in bins (*Dehri / Kuthila*), *Bhusauli* to protect from moisture and insects. For Kharif produce (Paddy & Maize) 70% farmers use *Dehri / Kuthila*, 3.33 per cent *Bhusauli* and 23.33% use Jute/Nylon packets/sacks to protect their produce. In the Rabi season 83.33% farmers use *Dehri / Kuthila*, 3.33% *Bhusauli* and 3.33% sacks and only 3.33% farmers use medicine to protect the agriculture produces/grains from moisture. Farmers who produce pulses and oil seed store their produce in the Jute packets/sacks.

Prevalence of insects *Ghun/weevil* (*Sitophilus granarius*) in the agriculture produce is seen in the area. The farmers who face the problem of insects in the produce use the chemical medicine (Sulfas) to protect their grains stored with them in the various methods explained here in above.

Per capita cereal consumption of food has declined somewhat over the past three decades, while the consumption of fruits, vegetables, meat, fish, eggs and dairy products has increased. For a country of India's size and population, importing huge quantities of grains is not feasible. The increased demand has to be primarily met through increase in productivity gained through increased application of knowledge by the farmers. (Rasheed 2000: 02).

It is well known that small and marginal farmers are not fully dependent on the agriculture based livelihoods to maintain all the things from agriculture or its allied sector; they are also capable of producing the grains to

maintain food security of their families for a year as a whole. As per data presented in the Fig. 10 only around 33% of the farmers are not getting food from their own agriculture produce for whole year; while 67% per cent of the small and marginal farmers get the food for whole year from their produce in Gilaula block of Shrawasti district.

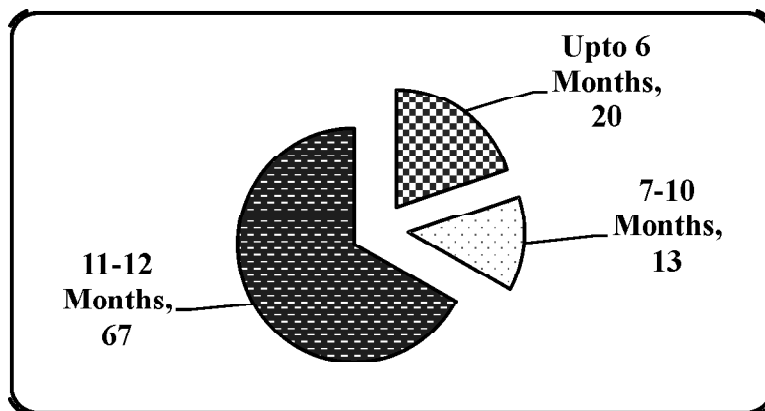


Figure 10: Period for Availability of Food Grains

Farmers produce grains, not only for self consumption but also for others. They use their products for self consumption i.e. food & seed and sell it either for purchase of fertilizers, irrigation and other personal use or in case of extra for one's own food. Farmers of the area are utilizing agriculture wastes as fodder for their line-stock, fuel for cooking, composting and for other uses like thatched roof (*Chhappar*) etc.

Cropping Pattern, Intensity and Cost Benefit Ratio

Cropping Pattern

The green revolution in India has given scope to develop infrastructure in agricultural sector like irrigation, capital, extension services, market linkage and electrification in the rural areas, but mostly in the developed regions (ignoring the less developed regions of small and medium farmers). 'The single most important element in crop production strategy in the post-green revolution period is improved agricultural technology consisting of high yielding plant varieties, intensive cultivation, greater use of fertilisers, increased irrigation and better techniques for planting, harvesting and plant protection developed for a number of crops, but their impact on production, productivity and costs, varies across crops and regions.' (Mruthyunjaya and Kumar 1989: A-159). Most common crop rotations like Rice-Wheat, Maize-Lahi, and Maize-pulses etc. are being followed in the area. Sugarcane is main

cash crop of the Shrawasti district of Eastern Uttar Pradesh, where farmers have also started peppermint production.

'Rice is the major crop in Uttar Pradesh and is grown in about 5.90 mha which comprises of 13.5% of total rice in India. The state ranks 3rd in the country in production of Rice. Rice farming in the state is most vulnerable and risk prone due to complex ecological situations marked by frequent flood or drought or both. The area production & productivity during last 10 years has been stagnant around 2.0 t q/ha since 2001-2002 except in the year 2002-2003, 2004-2005 and 2009-2010 due to erratic rainfall, which causes excess water stagnation/ drought or both in different years' (Dwivedi 2012: 2-3). The rice productivity in the district Shrawasti found to be 19.07q/ha (Dwivedi 2012: 2-3), whereas the same is 21.50q/ha in Eastern Uttar Pradesh and 22.54q/ha in Uttar Pradesh (Agriculture Statistics 2017). The productivity of Paddy varies from 7-8 q/acres (17-20q/ha) as per information provided by the farmers. It is very low due to highly flood prone area of the region.

Wheat (*Triticum aestivum* L.) is an important cereal crop of the world, which grows under a varied range of climatic conditions (Singh M & Supriya K 2017: 2295). The productivity of Wheat in the Shrawasti (19.76 q/ha) and Eastern Uttar Pradesh (19.94q/ha) is lower than 20.27q/ha in Uttar Pradesh (Field Survey 2013, Agriculture Statistics 2017).

In the district Shrawasti, most of the farmers sow Paddy (60%) and Maize (7%) during Kharif season (Fig. 11). As per value chain analysis, the farmers of the area have no profit in production of paddy because the agriculture land is being covered by flood of river Rapti during Kharif season.

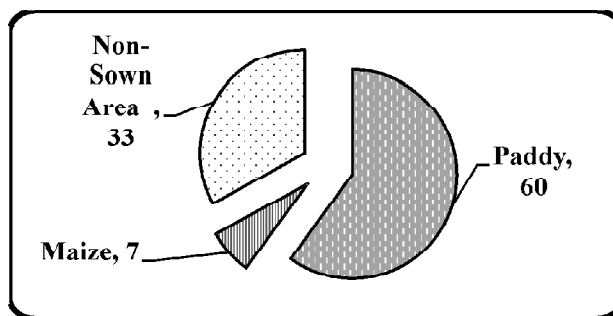


Figure 11: Cropping Pattern in Kharif Season

During Rabi Season, most of the farmers sow Wheat 65% and Lentils 21% in district Shrawasti. Farmers also sow Mustard (4%), Pea, Potato and other vegetables (3%) for their own consumption. There is 11% agriculture land which has still not been sown due to non-availability of proper irrigation facility in the area (Fig. 12).

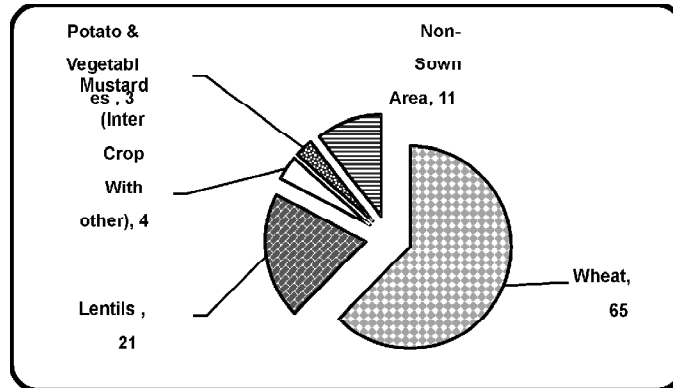


Figure 12: Cropping Pattern of Rabi Season

In the Zaid season only 10% land is used for the production of Peppermint and around 2% for Baishakhi Urad (Fig. 13). As per cropping pattern that exists in the area, 88% of agricultural land is underutilized during Zaid season due to increasing cost of irrigation and fear of *NILGAI* (*Boselaphus Tragocamelus*).

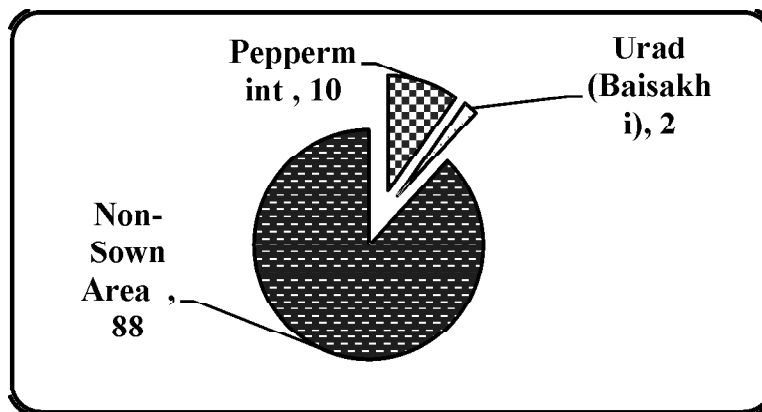


Figure 13: Cropping Pattern in Zaid Season

Cropping Intensity

Farmers need money for investing in fertilisers, pesticides and all other ingredients required for modern agriculture, including valuable information and technological enhancement. Less availability of money for investment and resources with poor farmers affect productivity and thus turning into a poor cycle and pushing them far away from success in improving productivity and cropping intensity on their lands. Cropping intensity has gone up in Uttar Pradesh from 149.4% to 157.53% over the last decade representing

intensification of agricultural land and input use (Agriculture Statistics 2017; Verma, Gulati, and Hussain 2017:8). The cropping intensity of Eastern UP and Shrawasti district was reported as 157.82% and 141.63% respectively (Agriculture Statistics 2017), while it was measured to be 168.33% during present study in the selected villages of district Shrawasti (it is higher than the district may be due to farmers who were engaged in the present study). Farmers who have land (upto 0.5 acre) have lowest cropping intensity in the area i.e. 162.5%, where as farmers having larger land size (>4 acres) have highest cropping intensity i.e. 187.5%; which is higher in comparison to less landholding due to availability of resources with them. There is 175% cropping intensity with those farmers having 0.5-1 acre, 1-2 acres, 2-3 acres and 3-4 acres landholdings (Fig. 14). There is ample scope for the farmers in the area for increasing the cropping intensity to improve agriculture based livelihood for the survival of farmers.

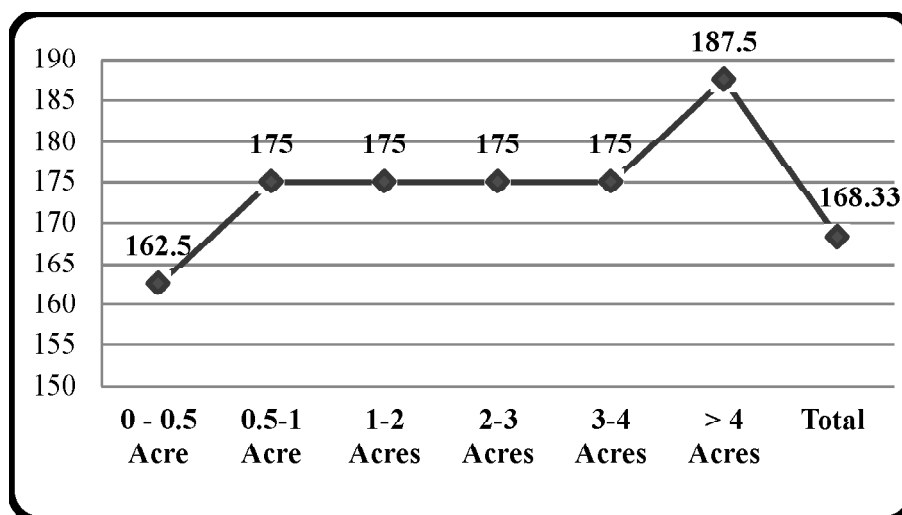


Figure 14: Cropping Intensity

Cost Benefit Ratio

Cost reducing technological developments along-with product price policy has their own impact on rate of profit, income to farmers and shifts in cropping pattern (Mruthyunjaya and Kumar 1989: A-163). Agriculture is being mechanized day by day in the district of Shrawasti, Uttar Pradesh as well as in the whole country which on one hand increases the production but on the other hand hikes the cost of production. It was already proved that production of *dicots* crops (pulses, vegetables and oil seeds etc.) more beneficial in comparison to the *monocots* crops (Paddy, Wheat and Maize etc.). Cow Pea (*Boda*) (CBR 1:3.63) is one of the most profit making crops of the Zaid season

in the GDS-JTT project area of Maharajganj district (one of the Nepal bordering district of Uttar Pradesh (GDS 2013: 21-22).

The production of Paddy varies between 7-8 quintal/ acre (17-20q/ha) in the study area and it is very low due to loss in flood as per value chain analysis. As per data provided by the farmers during value chain analysis, input cost was higher than output cost, hence cost benefit ratio has negative relation i.e. 1: 0.92 in paddy production. The detailed information related to cost of production in paddy is given in the Fig. 15.



Figure 15: Cost Benefit Ratio in Paddy

Wheat is a major crop of Rabi season in the District Shrawasti. Due to low fertile soil and poor infrastructure facilities in this region, farmers produce wheat up to 8 q/acres (19.76 q/ha) on an average in the study area. As per interaction with the farmers of the area during value chain analysis, they are in less benefit of 120% in production of wheat (Fig. 16).



Figure 16: Cost Benefit Ratio in Wheat

Status of Soil Components in the Shrawasti District

Degradation of soil is another emerging area of concern. It has been estimated that in India out of the total 140 million hectares, nearly 120 million hectares of soil suffers from varying degrees of degradation. The quality of soil has deteriorated over time due to a combination of factors, such as injudicious use of fertilizer, accumulation of heavy metals and metalloids through various forms of emissions. (GOI 2016:15). On an average the status of soil in the study area is in normal range with silt (38.80%) and clay loam (37.60%) texture. The pH value is in medium range, where Electrical Conductivity of the area is in normal range. The average availability of Organic Carbon (0.18-1.01%) and Nitrogen (323.23-354.43) in the soil is medium, the availability of Phosphorus (15.2-162.63 kg/h) is high, Potash (91.74-536.58 kg/h) is medium and Sulfur (16.34-187.00 kg/ha) touches a high range in this area. On one hand some micronutrients availability is high (Zinc 2.10 ppm) and Iron (22.60 ppm) from normal range and on the other hand Magnesium (18 ppm) is low in the soil at Gilaula block of District Shrawasti. The availability of Copper varies from low to high (GDS 2013:34).

Limitation in Adoption of Modern Farming Techniques

Indian farmers are presently adapting to farm mechanisation at a faster rate in comparison to recent past. The use of tractors to a great extent reflects the level of mechanisation. It is to be noted that even the smallest farmer prefers renting a tractor for half an hour for ploughing his land in comparison to ploughing his field through bulls. Indian tractor industries have emerged as the largest in the world and account for about one-third of total global tractor production (The Economic Times, 2018).

The World Bank estimated that percentage of agricultural workers in total work force would drop to 25.7 per cent by 2050 from 58.2 per cent in 2001. Thus, there is a need to enhance the level of farm mechanisation in the country (The Economic Times, 2018). Farmers of the study area have adopted modern farming practices to improve their agriculture based livelihood and to save the time for allied activities as well as for seasonal migration. Following limitations in terms of adopting of modern farming practices in the study area need to be highlighted.

1. The major problem of the small and marginal farmers of the area is small and fragmented holding of their agriculture land. There is low availability of new technical support from government schemes due lack of knowledge (76.67 per cent). The infrastructural and support/service systems needed for agricultural development like, credit, input supplies, post production value addition and processing, storage, marketing, etc. are in a very poor shape in this area and even Kisan Credit Card (KCC) is not being made available to small and marginal farmers due to lack of support from the banks and development officers.

2. The region suffers from major infrastructural bottlenecks and the basic infrastructural facilities like housing, toilets, health, education, transportation, electricity, etc. are highly inadequate don't 18% farmers have their own land and depend on others' land as shared cropping. They also depend on others' for irrigation, land preparation, threshing and other technical input. Farmers also face challenges in finding reliable source of seeds for seeds and varietal replacement to improve their production, productivity and finally cost benefit ratio (CBR).
3. Over the last two decades, the agriculture sector has witnessed a trend of increasingly low 'return on investment' from agricultural operations due to ever increasing cost of inputs (particularly, the costs of irrigation, fertilizer, mechanisation and labour) and stagnating output values to the farmers in Uttar Pradesh. Marketing, transportation and timely availability of chemical fertilizer is also a major problem of the small and marginal farmers, hence leading to low production and the productivity affecting the cost benefit ratio (CBR) in the major crops like paddy and wheat in the study area.
4. Agriculture in this region is also highly vulnerable to the vagaries of nature- floods. Around 48% farmers are facing problem of either flood or water logging in rainy season every year in the District Shrawasti. Here soil is less fertile, due to flood prone plains of the Rapti River. The floods not only affect the monsoon season (Kharif) crops in the areas, but also degrade up to 30-40% of the agriculture land which is prone to water logging for 3-4 months. This affects the cropping and productivity in the Rabi season.
5. Agriculture research and extension facilities in this region have failed to develop and introduce new technologies to bring-up the agriculture sector which is competitive in the light of new liberal economic scenario.
6. The status of the 'social capital' in terms of the opportunities for participation in informal/formal networks and associations of assistance and mutual support (like, cooperatives, self-help groups, farmers' clubs, political associations, etc.) is very poor among the farming communities in the district.

Conclusion and Specific Suggestions

Farmers ensure food security to millions, but it also leads to degradation of natural resources. Paddy, wheat and sugarcane are considered as major crops of the District Shrawasti as well as of other districts of Uttar Pradesh. This has created measurable change in production. Continuous cropping of paddy-wheat pattern during last 5 decades has increased production of sugarcane and peppermint. However it has created many fold problems such as deteriorated soil structure, developing nutrients deficiency,

build up pests including weeds, declining fertility and crop productivity and decrease in profitability etc. in the farming sector. High degree of rainfed agronomic conditions are also responsible for uneconomic farming in Eastern Uttar Pradesh. In addition to low economic status, poor knowledge to adopt new technologies and lack of social capital make the farmer vulnerable in current socio-political condition. Alternate farming practices needs to be introduce in this region to improve agriculture based livelihood of small and marginal farmers.

In Shrawasti district of Uttar Pradesh most of the farmers have agriculture as a primary or secondary source of livelihood. There is a need to strengthen and revitalize the agriculture based livelihoods of the small and marginal farmers from the remote and backward border district of Shrawasti, Eastern Uttar Pradesh to improve the quality of their lives and the sustainability of the natural resources. Findings reveal that the key reasons for the decline of profit in the agriculture sector are: 1) fragmented and smaller size of land holdings, 2) poor soil sustainability, 3) increased input cost, 4) low cropping intensity, 5) poor extension services and market linkage and 6) low quality and unskilled education system etc. These make farming ‘uneconomic’ under the present production system.

In order to deal with some of these issues, following points needs special attention by the farmers and policy makers:

1. The state government has the responsibility that all the agriculture land should be covered under *chakbandi/consolidation* to provide single land piece to a farmer and it may be supportive to make such farmers field neighbour who have a common interest. It will help them to develop common resources for irrigation, cultivation and post harvesting process and integrated farming. Finally, farmers will save their time, reduce input cost and improve soil fertility through treatment as directed by the soil scientists after which the farmers may call on their own resources. Farmers are suggested to adopt Zero Till method in wheat cultivation to reduce input cost and improve productivity.
2. There is an ample scope of improving cropping intensity in the study area upto 300% through adoption of farming in all three seasons. Special focus has to be given in Zaid cropping season. There is need of diversification of existing agriculture production system as well as development of efficient resource management strategies for sustaining higher profitability and soil health under intensive agricultural production systems.
3. Integrated farming system model of 1.5 acre under irrigated conditions is more remunerative in returns and employment generation thus proving to be profitable for the small and marginal farmers *in terms*

of *Eastern Uttar Pradesh* (Sharma RL *et al.* 2017:68). It is the responsibility of the government to provide low cost and eco-friendly irrigation facilities to the small and marginal farmers for their sustainable livelihood. Cropping pattern in the area needs modification with farming system approach to enhance the income and agriculture based livelihood of farmers for upliftment in quality of life in the area. Fruit plantation (Papaya on bunds), vegetables and Duckery will be more profitable for the farmers in the district Shrawasti, if infrastructure and social capital is developed in the area. As social capital lowers the costs of working together, it facilitates cooperation. People have the confidence to invest in collective activities, knowing that others will also do so (Pretty J and Smith D 2004). Social capital could play positive role for sustainability in modern farming techniques and strengthening the livelihood of farmers in the area, if transparency is to be maintained by the social-ecological system.

4. Civil society organizations by strengthening the social capital could play a crucial role to develop the model for marketing linkage at metros for early varieties of vegetables, fruits and other produces of farming in the area. They can also search for bamboo based livelihood entrepreneur for landless families in the region.
5. Improve social science and technical skills of extension personnel and with respect there is need to introduce assessment, group formation, mobilisation, negotiation, conflict resolution during the group and agricultural activities. Social scientists should also help to make positive change in the mindset of feudalistic society towards poor resource farmers.

ACKNOWLEDGEMENT

I am grateful to Prof. JL Dwivedi, Sr. Agriculture Scientist & Rice Breeder for critical reading of manuscript & technical support and to Mr. SK Dwivedi, Executive Director, Grameen Development Services, Lucknow for giving me opportunity as a consultant for study in this area.

REFERENCES

Agriculture Statistics

- 2017 *Agriculture Statistics of Uttar Pradesh*, Director, Agriculture Statics and Crop Insurance, Krishi Bhawan, Lucknow Publication No.- 281, April.

Andersson, E.

- 2017 *Managing Flexibility and Expectations: Gendered Experiences of Spatial-temporal Relations in Swedish Family-based Dairy Farming*, *International Journal of Sociology of Agriculture & Food*, Vol. 23 (2). 77-97.

Ballabh, V. & Pandey, S.

- 2009 Transitions in Rice Production Systems in Eastern India: Evidence from Two Villages in Uttar Pradesh, *EPW*: 34(13).

C-DAP

- 2013 Comprehensive District Agriculture Plan- Shrawasti 2012-13 to 2016-17, Shrawasti: District Planning Committee.

Chaturvedi, A. Patil, N. G. & Goswami, S.N.

- 2011 Reorienting Land Use Strategies for Socio-economic Development in Uttar Pradesh, *EPW*, 46 (26/27), (Review of Agriculture).

Chayanov, A. V.

- 1986 *The Theory of Peasant Economy*. Madison: The University of Wisconsin Press.

ASSOCHAM

- 2015 Uttar Pradesh is the Lowest among the Traditional BIMARU States: An ASSOCHAM Study, <http://www.dnaindia.com/india/report-uttar-pradesh-lowest-among-bimaru-states-in-9-yrs-growth-assochem-2029041>.

Das, Sarmistha

- 2017 "Agrarian Change and Women: Explorations from the Field", *The Eastern Anthropologists*, 70 (3-4) pp-219-32.

Dwivedi, J. L.

- 2012 Status Paper on Rice in Uttar Pradesh, Rice Knowledge Management Portal (RKMP) Directorate of Rice Research, Rajendranagar, Hyderabad 500030. <http://www.rkmp.co.in>

GDS

- 2011 Revival of Agriculture Based Livelihoods in Nepal Bordering Districts of Eastern Uttar Pradesh and Northern Bihar, Project Document, Lucknow: Grameen Development Services.

GDS

- 2013 Baseline Report of Maharajganj District-Revival of Agriculture Based Livelihoods in Nepal Bordering Districts of Eastern Uttar Pradesh and Northern Bihar, Lucknow: Grameen Development Services.

Government of India

- 2016 State of Indian Agriculture 2015-16, Ministry of Agriculture & Farmers Welfare, Department of Agriculture, Cooperation & Farmers Welfare, New Delhi : Directorate of Economics & Statistics.

GoUP

- 2017 Revised State Income Estimates, Economics & Statistics Division, State Planning Institute, Government of Uttar Pradesh, Retrieved from: <http://www.updes.up.nic.in>

Gupta, P. and Thakur, M.

- 2017 "The Changing Rural-agrarian Dominance: A Conceptual Excursus", *Sociological Bulletin*, 66(1) pp-42-57.

Hilde, Bjorkhaug

- 2012 "Exploring the Sociology of Agriculture: Family Farmers in Norway – Future or Past Food Producers?" in Dennis Erasga (ed.) *Sociological Landscape – Theories, Realities and Trends*, In Tech, Croatia and Shanghai www.intechopen.com

IASRI

- 2011 Agriculture Census in India. New Delhi: Indian Agricultural Statistical Research Institute.

IBEF

- 2018 Agriculture and Allied Industries, India Brand Equity Foundation, New Delhi Retrieved from: <https://www.ibef.org/industry/agriculture-india.aspx>.

IWMP

- 2009 Integrated Watershed Management Programme (IWMP) in Uttar Pradesh Perspective and Strategic Plan 2009-2027, Department of Land Development and Water Resources, Government of U.P.

Kumar, A. *et al.*

- 2001 Productivity, Profitability and Stability of Rice (*Oryza sativa*)-Based Cropping Systems in Eastern Uttar Pradesh, *Indian Journal of Agronomy* 46 (4). 573-577.

Lerche, J.

- 1998 Agricultural Labourers, the State and Agrarian Transition in Uttar Pradesh, *EPW*: 33 (13). A29-A35.

Mruthyunjaya & Kumar P.

- 1989 Crop Economics and Cropping Pattern Changes, *EPW* : 24(51/52).

NRAA

- 2012 Prioritization of Rainfed Areas in India, Study Report-4, National Rainfed Area Authority, Planning Commission, Government of India, New Delhi.

Patnaik, U. & Hasan, Z.

- 1995 "Aspects of the Farmers' Movement in Uttar Pradesh in the Context of Uneven Capitalist Development," in *Indian Agriculture' in T V Sathyamurthy (ed.), Industry and Agriculture in India since Independence. Social Change and Political Discourse in India, Structures of Power, Movements and Resistance*, New Delhi: Oxford University Press Vol. 2, pp 274-300.

PCA

- 2011 Primary Census Abstract. New Delhi: Office of the Registrar General and Census Commissioner, India.

Pretty, J. and Smith, D.

- 2004 "Social Capital in Biodiversity Conservation and Management", *Conservation Biology* : 18(3). <https://www.researchgate.net>.

- Randall, R. P.
2017 *A global compendium of weeds*. Perth, Australia: RP Randall.
- Rasheed, S. V.
2000 *Agricultural Extension in India - The Next Step, Policy Brief-9*, New Delhi: National Centre for Agricultural Economics & Policy Research.
- Sharma, R.L. *et al.*
2017 Comparative Performance of Integrated Farming System Models in Gariyaband Region Under Rainfed and Irrigated Conditions, *Indian Journal of Agricultural Research*, 51(1). 64-68. <http://www.arcejournals.com>
- Singh, M. & Supriya, K.
2017 Growth Rate and Trend Analysis of Wheat Crop in Uttar Pradesh, India *International Journal of Current Microbiology and Applied Sciences*, 6(7). 2295-2301.
- Stokes, E.
1978 *The Peasant and the Raj: Studies in Agrarian Society and Peasant Rebellion in Colonial India*. Cambridge University Press, Cambridge.
- The Economic Times
2016 Agriculture sector grows by 1.6% in first 4 years of 12th Five Year Plan, <https://economictimes.indiatimes.com> (March 15).
- The Economic Times
2018 Agriculture sector to grow 2.1%: Can it double farm income by 2022?, ETMarkets.com (Jan 29).
- Tripathi, H.P. and Kumar, A.
2010 *Compendium of Cropping Systems Research In Three Decades*, Faizabad: Department of Agronomy, N.D. University of Agriculture and Technology.
- Verma, S. Gulati, A. and Hussain, S.
2017 Doubling Agricultural Growth in Uttar Pradesh: Sources and Drivers of Agricultural Growth and Policy Lessons, Working Paper 335, New Delhi: Indian Council for Research on International Economic Relations.
- Weber, Max
1904/2001 *The Protestant Ethic and the Spirit of Capitalism*, Routledge, London.