

**STUDY OF PADDY SEED REPLACEMENT
RATE IN VARANASI DISTRICT OF
UTTAR PRADESH**



Project Report

SUBMITTED IN PARTIAL FULFILLMENT OF THE
REQUIREMENTS FOR THE DEGREE OF

*Master
of
Agribusiness Management*

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Submitted By:
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CERTIFICATE

To,
The Registrar (Academic)
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Dear Sir,

This is certify that the Project report entitled “**Study of Paddy Seed Replacement Rate in Varanasi District of Uttar Pradesh**” submitted in partial fulfillment of the requirement for the degree of **Master of Agri-business Management**, in the Department of Agricultural Economics, Institute of Agricultural Sciences, Banaras Hindu University, is a record of bonafied research carried out by Mr. Amit Kannaujia, ID. NO. ABM-14212 under the supervision and no part of the project report has been submitted for any other degree or diploma.

I certify that the entire scheme of investigation, presented here in, was planned and carried out solely by the candidate under my guidance. To the best of my knowledge, the data presented in the report are genuine and original.

Thanking you,

Yours Faithfully

Head

Coordinator

(O. P. Singh)
(Supervisor)

TO STUDY THE PADDY SEED REPLACEMENT SCENERIO IN VARANASI DISTRICT OF UTTAR PRADESH



By

Amit Kannaujia

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Submitted in partial fulfillment of
the requirement for the degree of

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INTRODUCTION

Rice (*Oryza sativa*) is one of the most important staple food crop for more than half of the world population, especially for south-eastern Asia, where 90 percent of the world population of rice is grown and consumed. In India, it is cultivated on an area of 65.20 million hectares with a total production 103.81 million tonnes.

Agriculture is the mainstay of the Indian economy and is the principal means of livelihood for nearly 50 per cent of the population. The contribution of agriculture to India's GDP was no more than 13.6 per cent during 2013-14. Even though, India is primarily an agricultural economy, with almost two-third of its population make out the existence from farmland. However, challenges before agriculture has been increasing such as environmental and technological changes, hike in input price and fluctuation in output prices.

Seed being the fundamental input in crop production; its high quality forms the basis of high productivity. Although seed accounts for a minor portion of the total costs in a majority of crops, on this vital input depends the returns one obtains from land using other costly inputs like farm machinery, irrigation, chemical fertilizers, pesticides, labor, etc. Much of the efforts and investment would be in fructuous if one does not use quality seeds. The quality seed production is a specialized activity. The general farm produce retained for seed cannot be substituted for quality seed as it generally lacks genetic vigor and has poor germination (Singh *et al.*, 1990). One of the reasons for low replacement of certified seed could be its high price and non-availability at proper place in time. It is particularly true in the case of small farmers who generally have low availability of cash money. It may be mentioned that seed replacement rate (SRR) of paddy is low (39.35 per cent) in India (<http://seednet.gov.in>). The seed renewal period as recommended by the National Commission on Agriculture (1976), is four years in paddy. The SRR in most crops is below the scientifically desirable level of 25 per cent in respect to self- pollinated crops (Kapoor, 2006)

The potential yield of crop depends on the quality of the seed used for cultivation of crop. Use of quality seeds alone can enhance the crop productivity by 15-25%. One of the main reasons

for low productivity of crops is unavailability of reliable quality seeds in the local markets. To enhance productivity, seed should be of high quality, which will express full potential yield of the genotype under favorable cultivation environments. Therefore, there is urgent need to establish quality seed sources at least for major crops of northern part of Uttar Pradesh

1.0 Seed Production system in India

The Indian seed production programme largely adheres to the limited generation's system for seed multiplication in a phased manner. The system recognizes three generations namely breeder, foundation and certified seeds and provides adequate safeguard for the quality assurance in the seed multiplication chain to maintain the purity of the variety as it flows from the breeder to the farmer.

1.1 Types of the quality seeds

1.1.1 Breeder Seed

Breeder seed is the progeny of the nucleus of a variety and is produced by the originating breeder or by a sponsored breeder. Breeder seed production is the Indian council of Agriculture Research (ICAR) and being undertaken with the help of ICAR Research Institution, National Research Centre and all India coordinated Research Project of different crops; state agriculture universities (SAUs) with 14 centers established in different states; sponsored breeders recognized by selected state seed corporations, and non-government organizations. ICAR also promotes sponsored breeder seed production programme through the national seeds corporation (NSC) / state seed corporation (SSCs), Krishi Vigyan Kendra's (KVKs) etc. There has been a steady increase in the production of breeder seed over the year in country.

1.1.2 Foundation Seed

Foundation seed is the progeny of breeder seed and required to be produced from breeder seed or from foundation which can be clearly traced to breeder seed. The responsibility for production of foundation seed has been entrusted to the NSC, SFCI, state seeds corporation, state Department of Agriculture and private seed producers, who have the necessary infrastructure facilities. Foundation seed is required to meet the standards of seed certification

prescribed in the Indian minimum seeds certification standards, but at the field and laboratory testing.

1.1.3 Certified Seed

Certified seed is the progeny of foundation seed and must meet the standard of seed certification prescribed by in Indian minimum seeds certification standards 1988. In case of self-pollinated crops, certified seeds can also be produced from certified seeds provided it does not so beyond three generation from foundation seed.

The production and distribution of quality/certified seeds is primarily the responsibility of the state Government. Certified seed production is organized through state seed corporation, Department agriculture farm, and cooperatives etc. The distributor of seed is undertaken through a number of channel i.e. department outlets at block and village level, cooperatives, outlets of seed corporation, private dealers etc. The efforts of the state Governments are being supplemented by NSC and SFCI which produce varieties of national important. NSC markets its seeds through its own marketing network and also through its various networks. SFCI markets its seeds mainly through the state Department of agriculture and the state seed corporations. The production of certified of certified seed by NSC and state seed corporations. It mainly organized through contract growing arrangements with progressive farmer. The private sector has also started to play an important role in the supply of the quality seeds of vegetables and crops like hybrid maize, sorghum, Bajra, cotton, castor, sunflower, paddy etc.

The requirement of certified/quality seeds is assessed by state Government on the basis of the area sown under different crop varieties, area covered by hybrid and self-pollinated varieties as well as seed replacement rate achieved. The availability of seed is ascertained by the state Department of Agriculture on the basis of the production of seed in government farms and production of seed by state seed corporations and other agencies. The Government of India periodically assess requirement and availability of the seed through detailed interaction with state review meeting and the national kharif and rabi conferences. The Department of Agriculture and cooperation facilitates tie-up arrangement with seed producing agencies to ensure that the requirement of seed is met to the maximum extent possible.

1.2 Roll of Public and Private Seed Sector

The private sector has started to play a significant role in the seed industry over the last few years. At present, the number of companies engaged in seed production or seed trade is of the order of 400 or 500. However, the main focus of private seed companies has been on the high value and low value seeds and market for low value high volume seeds of cereals, pulse, oil seed and paddy. Seed is still dominated by the public sector seed corporation. Private sector companies have a significant place mainly in the case of maize and sunflower and cotton and paddy. However, in the case of vegetable seeds and planting materials of horticulture crops, the private sector is the dominated player. As the private sector has not been enthusiastic about entering into seed production of high volume low margin crops of wheat, paddy, other cereals, oilseed and pulse and oilseeds for many more years to come the main sources of producing quality seed for these crops with government agency.

1.3 Seed Replacement Rate

Ideally seed should be replaced every year for hybrid and every three to four year for non-hybrids. However, in practice seed is replaced less often especially, in case of open pollinated crops. As a consequence, seed replacement rates are lower than recommended for different crop varieties. As adequate information is not available on replacement schedule followed by a farmer, How to compute actual replacement rate one simple method to take the ratio of quality seed of a particular crop produced during the year to the total seed needed during the year. Seed replacement rate for different crop during different year for country as whole and Uttar Pradesh is presented in Table 1 and Table 2. At country level, the highest seed replacement rate was found for paddy crop (38 percent) and lowest for sesamum during 2013 -14.

Table 1.1: Seed Replacement Rate in India

S.no	Crop	2007-08	2008-9	2009-10	2010-11	2011-12	2012-13	2013-14
1	Paddy	29	30	31	33	35	37.5	38
2	Ragi	26	27	28	29	30	32	31
3	Jowar	23	23.5	24	25	25	26	28
4	Bajara	25	26	27	28	30	33	35
5	Wheat	18	18.5	19	19.5	20	20.5	22
6	Redgram	19	20	22	24	25	27	29
7	Greengram	19	20	22	24	25	27	28
8	Blackgram	19	20	22	24	25	26	27.63
9	Cowpea	19	20	22	24	25	27	29
10	Bengalgram	19	19.50	19.50	20	20	21	21.36
11	Groundnut	9	10	10.5	11	12	13	13.98
12	Sunflower	23	24	24.50	25	25	26	27
13	Safflower	19	21	23	24	25	26	27
14	Soybean	28	29	31	33	35	36	38
15	sesamum	8.5	9	9.5	10	10	11	12
16	Castor	8.5	9	9.5	10	10	11.5	12.56
17	Cotton	14	16	18	19	20	21	22

Source: www.seednet.gov.in

In case of Uttar Pradesh, highest seed replacement rate was found for moong with 96.5 per cent and lowest for Arhar (26 per cent) during 2014. In case of paddy, the seed replacement rate was 22 per cent in 2008 and it was increased to the level of 38 per cent by the year 2014. In case of wheat, the seed replacement rate was 24 per cent in 2008 and it was increased to 45 per cent by the year 2014.

Table 1.2: Seed Replacement Rate in Uttar Pradesh (Percent)

Year	Wheat	Paddy	Gram	Moong	Arahar
2008	24	22	15	20	18
2009	26	25	16	56	19
2010	32	28	19	75	19.4
2011	38	31	21	95	21.5
2012	41	34	25	96	23
2013	43	37.69	26	96	25
2014	45	38	28	96.5	26

Source: www.seednet.gov.in

So we can say that Indian Seed Improvement Programme is backed up by a strong Crop Improvement Programme in both the public and private sectors. At the moment, the industry is highly vibrant and energetic and is well recognized in the international seed arena. Several developing countries have benefited from quality seed imports from India. India's Seed Programme has a strong seed production base in terms of diverse and ideal agro-climates spread throughout the country for producing high quality seeds of several tropical, temperate and sub-tropical plant varieties in enough quantities at competitive prices. Looking the importance of seed, in agricultural output, present study was carried out with following objectives.

2.0 Objectives

The overall objective of present study was to assess the paddy seed replacement rate in Varanasi district of Uttar Pradesh. The specific objectives of present study were:

1. To analyse the current status of paddy seed replacement rate in Varanasi District of Uttar Pradesh;
2. To study the different agency involved in the supply of paddy seed production and distribution in Varanasi.
3. To analyse the demand and supply of paddy seed.
4. To find the causes of low paddy seed replacement rate.

REVIEW OF LITERATURE

This chapter deals with the past research works done by the scientist in the field of the seed replacement rate in different parts of the world. The review of literature helps for the setting up the current research. It is also helpful in the use of analytical tools etc.

Kumar (2014) in their paper “Economy of seed production” concluded that the fundamental practices are the same regardless whether one is producing seed of Kentucky bluegrass for a major seed company using a conventional agricultural management approach or if producing organically-grown vegetable seed for a small local company. The only differences evident in these examples are the management philosophy and approach to the farming operation in these enterprises. Both enterprises have costs and returns associated with the production of seed. Most grass seed production enterprises in the Pacific Northwest are family-based entities where most labour and effort is provided by the family rather than employees external to the farming operation. Further, to the Economics of Seed Production, the research found that the decision to grow a particular seed crop on a farm in the Pacific Northwest is based on: site considerations - soil type, drainage, rainfall irrigation, other factors.

Parmar, *et al.* (2014) designed to measure input use, cost structure, return and resource use efficiency in wheat production of South Gujarat region of Gujarat, India. The authors were used the log linear type Cobb-Douglas production function. The results revealed that the average total cost of cultivation of wheat was Rs 45784.31 per hectare. It was the highest on large farms (Rs 45720.79) followed by on medium farms (Rs 39016.69) and lowest on small farms. Higher cost on large farms was associated with intensive use of human labour, bullock labour, manures & fertilizers and irrigation charges. The average overall farm harvest price received by the wheat growers was Rs 1552.79 per quintal. It varied from Rs 1500.43 on small farms to Rs 1597.43 on large farms. The average net profit per hectare over (Cost-C2) was Rs 20017.55 and it increased with the increase in size of farms. The overall input-output ratio was 1:1.44 on the basis of total cost of cultivation. It was the highest (1:1.48) on large farms, followed by medium farms (1:1.43), and small farms (1:1.35). The average cost of production per quintal of wheat was about Rs 1285.86 which was lower than the market price of wheat ranging from Rs 1600 to Rs 1950 per quintal. Functional analysis of wheat crop revealed that seed, N fertilizer, irrigation, human labour, No. of weeding, P fertilizer, F.Y.M, bullock labours, and No. of spray *i.e.* 0.511, 0.371, 0.288, 0.188, 0.171, 0.148, 0.059, 0.029,

and 0.020 respectively. This is positive and statistically significant, which indicated that if expenses made on these resources, then it will be gives profitable returns.

Ghosh (2013), in his research entitled “Spread of New Varieties of Hybrid Rice and their Impact on the Overall Production and Productivity in West Bengal” found that, the increase in rice production can be achieved through quality seed, hybrid seed and transgenic varieties tolerant to pests etc. The usage of farm saved seed is to be reduced and farmers are to be encouraged to use quality seed to increase productivity levels.

Rao (2011), reported that the growing population of India along with its changing food habits needs around 130 million tonnes of rice by 2025. Seed is the basic and critical input in crop production. The increase in rice production can be achieved through quality seed, hybrid seed and transgenic varieties tolerant to pests etc. The usage of farm saved seed need to be reduced and farmers are encouraged to use quality seed to increase productivity levels. Andhra Pradesh which is popular as “Seed Hub of India”, can produce required quantities of quality seed of varieties and hybrids on indents to various states, besides meeting its own requirements. Private sector is playing a key role in seed production in Andhra Pradesh. About 85 percent of the hybrid rice seed marketed in the country is produced in Andhra Pradesh. It is estimated that nearly 3.5 to 3.75 lakh qtls of hybrid rice seed was produced in Andhra Pradesh during Rabi 2010-11. The public sector research organisations, viz., ICAR/SAUs to provide the seeds of latest varieties/hybrids of rice to public and private sector seed companies on liberalised terms of MOA. The author concluded that to popularize the usage of quality seed, the Government of India should allow subsidy under different schemes for all popular hybrids without insisting for notification and release. This will help particularly for increase of area under hybrid rice in the country. In the absence of quality seed, the investments made on other agricultural inputs such as fertilizers, pesticides both under rain fed and irrigated conditions will not give desired yields. Thus, for raising the productivity levels in crops, “Quality seed is a must”. It is necessary to provide quality seed on time, in adequate quantities near the door steps of the farmers.

Shuay *et al.* (2011) examined the costs of producing snap beans and green Peas in New York State” found that it has been a long time since we have seen a cost of production study for horticultural crops, notably processing vegetable crops, in New York State; however, research in this arena is completed in many other states and continues to offer useful information to industry stakeholders. This type of information is especially

important in the processing vegetable sector in New York State as it has seen substantial acreage decreases in recent years. Here we develop a survey to collect data from processing vegetable growers in New York State and use it to calculate costs and net returns of producing snap beans and green peas. The results indicate that the average cost of producing snap beans in New York State is \$568 per acre and is \$563 per acre for green peas; the actual producer costs drop to \$402 and \$361 for beans and peas if the processor pays for expenses related to seeds, pesticides, and harvesting.

Kaliba *et al.* (2011) in their research entitled “Factors Affecting Adoption of Improved Maize Seeds and Use of Inorganic Fertilizer for Maize Production in the Intermediate and Lowland Zones of Tanzania” examines factors influencing the adoption of improved maize seeds and the use of inorganic fertilizer for maize production by farmers in the intermediate and lowland zones of Tanzania. The results indicate that availability of extension services, on-farm field trials, variety characteristics and rainfall were the most important factors that influenced the extent of adopting improved maize seeds and the use of inorganic fertilizer for maize production. Farmers preferred those varieties which minimize field loss rather than maximizing yields. Future research and extension policies should emphasize farmer participation in the research process and on-farm field trials for varietal evaluation and demonstration purposes

Kumar and Grover (2011), in their research work “Berseem Seed Production Economics” found that Berseem is an important crop of winter season and is popular both for milch and draught animals. The timely availability of seed to the farmers helps in timely sowing and realization of its full potential as fodder. Authors were found that the total returns from both fields and processing come to Rs 72692.58 per hectare. The average green fodder production was 498 quintal per hectare. The average total return was estimated to be Rs 69036.96 per hectare and the total cost of production was Rs 46430.44. The average net return from berseem was found as Rs 26262.14 and the benefit cost ratio was estimated to be 1.57.

Fletcher *et al.* (2009) investigated the impacts of research investment on wheat production. A two way error component random effect model was estimated using panel data to examine the effects of research investment on mean yield and yield variance during 1974 to 1995. The authors were found that research investment enhanced crop yield stability but had no significant impact on mean yield.

Verma and Sidhu (2009), reported that in the case of farmers of Punjab, amongst different source of paddy seed, share of private seed dealers has been found maximum followed by authorized seed dealer, self-retained and commission agents. The share of other source like fellow farmer's relatives and friends, PAU, village shopkeeper, State Agriculture Department etc. has been found only 1-2%.

Market conditions can have a dramatic effect on the price of seed. Since seed is an international commodity, seed production conditions and yields in all producing regions is an important factor affecting seed supply. The size of the carryover stock from the past harvest year can affect the price of seed. If demand is not great and current year harvests are adequate to meet this demand, then carryover of seed from the previous season will depress the price of seed. Low supply or high price of one species of turf grass can lead to substitution with another species in turf mixtures and can in turn, affect the price of the substituted species. Factors that affect the demand for seed vary from crop to crop and result in widely differing incomes for seed crops. Cycles in the construction industry affect the price of lawn seed, and changes in consumer nutrition preferences affect prices of food crop seed.

Raman and Desai (2006) reported that efficient rice marketing is one of the most important factors that determine the rural economy of Bangladesh. Present study focus on the standard of living of rice farmers, production structure, rice selling, marketing channel of rice, prices, profit by intermediaries, marketing efficiency and farmer attitude towards marketing. The study was based on the primary data collected through a survey of 33 farmer and 25 intermediaries carried in 2003 in Jhikarachaupzila in Jessore district, south-western part of Bangladesh. In the surveyed area, six type of middleman and eighteen types of major marketing channels were identified. The study found that 27 (82%) farmer sold exclusively unhusked rice and only 6 (18%) farmer sold partially husked rice. The quantity of unhusked rice sold to wholesalers of unhusked rice stockists, husker and village merchant were 32, 16, 27, and 14%, respectively. Although, among all eighteen channels husked rice selling to unhusked rice was converted to husked rice and sold through this channel. Husked rice sold through wholesalers of husked rice was also found to be a comparatively efficient channel, but only 5% of unhusked rice was converted to husked rice and sold through this channel. The study found that the marketing of rice was one of the main sources of income, its efficient marketing was essential for living standard.

Setimela *et al.* (2005) conducted study to address the issues that limits the access of seed by the small scale farmers in sub-Saharan Africa to quality seed, affordable seed of different crops on which they depend for food security and livelihood. The authors describes successful principles for and experiences in community based seed production. Among other things, authors were analysed current seed production system and models; proposed way to design successful community based seed production schemes; describe proper seed production practices for selected cereals, vegetative propagated plants , and other crops; and outline basic business for seed producers.

Aayogi (2005) reported that the “rice production according to demand” in the agriculture cooperative association policy needs conformity to the next subject in marketing of agriculture cooperative. The first is conformity to the user product needs according to the use, the price level, and quality. The second is conformity to the stable dealings demand of user about a price, the amount of supply and quality. The third is the positive proposal of the agriculture cooperative to the user through product differentiation. Naganuma and Iwamizawa Agriculture cooperative in Hokkaido, Japan, are the pioneers in this subject. According to the improvement in quality and rice breeding, products offered, etc. In addition to advertisement of the producing centre, exploitation of the market and low selling price, has been the important strategic subject of the agriculture cooperative rice marketing business in taking those subject, the production control or ‘individual management’ to the producer by the agriculture cooperative has become strong.

Tetley *et al.* (1991) found that cereal farmers in developing countries often have three major sources of seed i.e. seeds purchased from other farmer; self-retained seed from the previous year’s crop and seed purchase from the shops/research stations. In India about 85 per cent of seed used by the farmers are self-retained seed.

Most seed crops grown in the Pacific Northwest are produced under contract with seed companies rather than as commodities on a speculative basis. Annual ryegrass remains the largest seed crop produced in the region as a non-contract commodity. Contracts with the seed companies specify the price paid to the grower according to the quality of the seed. Under the terms of the contract, seed growers are obligated to plant the seed stock and to manage and harvest the crop. Discounts on contracts may be negotiated by the seed company if the seed quality standard specified in the contract or by the certifying agency is not met. Ownership of

seed and plants growing in the farmer's field remains with the seed company during the seed production process.

Seed contracts provide the seed company with option of rights on termination of the contract. This term specifies that the seed grower agrees to deliver seed to the seed company and destroy (plod out) plants in the field on termination of the contract. Finally, the seed company provides the grower with seed stock to be used in planting the crop at an agreeable price. There are two basic types of contracts. Firm price. A minimum price per pound is guaranteed under the terms of this contract type. In this type of contract, an amount over the market price is paid contingent on the quality of the seed.

Seed companies buy contracted seed or seed on the open market from seed growers, and from other dealers to meet the demand for seed. Seed brokers are individuals or companies that link the buyers of seed with sellers. Seed brokers have contacts with growers and with seed dealers, and have good knowledge of the availability of seed. Sellers pay the broker a brokerage fee. These fees range from \$15 per 1000pounds of seed for annual ryegrass to \$50 per 1000 pounds of seed for tall fescue. Seed brokers represent the buyer in the transaction and not the seller.

RESEARCH METHODOLOGY

Methodology is the nucleus of all social science studies. It comprises sampling design and analytical final result. Present study was exploratory in nature on primary data collected through field survey.

This chapter deals with the methodology used in achieving the objectives of the study. For cohesiveness and clarity in presentation, this chapter can be classified in to two sections. The first section focuses on the sampling design used for selection of district, block, village, farmers etc. The second section was related with the analytical tools and technical applied.

3.1 Sampling Design

Data has been collected both from farmers and market functionaries; multistage sampling was used.

3.1.1 Selection of district

The Uttar Pradesh State was purposively selected for the present study. The Uttar Pradesh has 75 districts. Among these districts, Varanasi district was selected purposively for present study.

3.1.2 Selection of block

There are 8 development blocks in Varanasi district namely Chiraigaon, Arajiline, Baragaon, Cholapur, Harahua, Kashi Vidyapeeth, Pindra, and Sevapuri. Among the eight development block, Baragaon was selected purposely, because Baragaon development block was having highest are and production of rice as compared to other development block of the district.

3.1.3 Selection of Villages

A list of all rice growing village was prepared and five village out of hundred farmers were selected purposely. These five village was **Fattepur, Kharawan, Eshipur, Devchandrapur and Namapur.**

3.1.4 Selection of Farmer

A list of rice growers from each selected village was prepared separately and rice growers.

From the each village 20 samples were selected proportionately using sample random sampling. Total 100 rice growers were selected for primary data collection.

3.1.5 Collection of data and method of enquiry

The present study was based on primary data and secondary data. Primary data were collected from the farmers using pre-tested schedule. The secondary data was collected from the District Agricultural Office, Varanasi. The secondary data was related to year wise are under rice in Varanasi district and year-wise different types of rice seed sold to the farmers in the district.

3.2. Analytical Tools

3.2.1 Paddy Seed Replacement Rate

The seed replacement rate (SRR) for paddy crop was worked out using following formula as given by (Sangeeta & Sidhu 2009) for certified seeds using Equation

$$SRR = \frac{C \times 100}{A \times K}$$

Where,

SRR = Seed replacement rate for the paddy crop,

C = Certified seeds used by the farmers,

A = Area under the paddy crop,

K = Seed rate per unit of area.

DESCRIPTION OF STUDY AREA

4.1 General description of Varanasi district

Varanasi is a city on the banks of the Ganga in Uttar Pradesh. It is located at 320 kilometers southeast of the state capital, Lucknow. It is holiest of the seven sacred cities (*SaptaPuri*) in Hinduism and Jainism. Hindus believe that death at Varanasi brings salvation. It is one of the oldest continuously inhabited cities in the world and the oldest in India. Varanasi is the spiritual capital of India. The name Varanasi possibly originates from the names of the two rivers: Varuna, still flowing in Varanasi, and Assi, a small stream near Assi Ghat. Varanasi is often referred to as “the city of temples”, “the holy city of India”, “the religious capital of India”, “the city of lights”, “the city of learning”, and “the oldest living city on earth.”

4.2 History of Varanasi

The land of Varanasi (Kashi) has been the ultimate pilgrimage spot for Hindus for ages. Often referred to as Benares, Varanasi is the oldest living city in the world. These few lines by Mark Twain say it all: "Benaras is older than history, older than tradition, older even than legend and looks twice as old as all of them put together". Hindus believe that one who is graced to die on the land of Varanasi would attain salvation and freedom from the cycle of birth and re-birth. Abode of Lord Shiva and Parvati, the origins of Varanasi are yet unknown. Ganges in Varanasi is believed to have the power to wash away the sins of mortals.

Ganges is said to have its origins in the tresses of Lord Shiva and in Varanasi, it expands to the mighty river that we know of. The city is a center of learning and civilization for over 3000 years. Sarnath, the place where Buddha preached his first sermon after enlightenment, just 10 km away from Varanasi. Varanasi has been a symbol of Hindu renaissance. Knowledge, philosophy, culture, devotion to Gods, Indian arts and crafts have all flourished here for centuries.

Vaishnavism and Shaivism have co-existed in Varanasi harmoniously. With a number of temples, Mrs. Annie Besant chose Varanasi as the home for her 'Theosophical Society and Pandit Madan Mohan Malviya, to institute 'Benares Hindu University, the biggest University in Asia. Ayurveda is said to be originated at Varanasi and is believed to

be the basis of modern medical sciences such as Plastic surgery, Cataract and Calculus operations. Maharshi Patanjali, the preceptor of Ayurveda and Yoga, was also affiliated with Varanasi, the holy city. Varanasi is also famous for its trade and commerce, especially for the finest silks and gold and silver brocades, since the early days.

Varanasi has also been a great center of learning for ages. Varanasi is associated with promotion of spiritualism, mysticism, Sanskrit, yoga and Hindi language and honored authors such as the ever-famous novelist *Prem Chand* and *Tulsi Das*, the famous saint-poet who wrote *Ram Charit Manas*. Aptly called as the cultural capital of India, Varanasi has provided the right platform for all cultural activities to flourish. Many exponents of dance and music have come from Varanasi. Ravi Shankar, the internationally renowned Sitar maestro and Ustad Bismillah Khan, (the famous Shehnai player) are all sons of the blessed city or have lived here for major part of their lives.

4.3 Geography

The city of Varanasi is located in the middle Ganges valley of North India, in the Eastern part of the state of Uttar Pradesh, along the left crescent-shaped bank of the Ganges river. It has the headquarters of Varanasi district. The "Varanasi Urban Agglomeration" — an agglomeration of seven urban sub-units — covers an area of 112.26 km² (approximately 43 mi²). The urban agglomeration is stretched between 82° 56'E - 83° 03'E and 25° 14'N - 25° 23.5'N.

Being Varanasi is situated in the agro climatic zone of eastern plain of Uttar Pradesh, bordering the district Jaunpur in the north, Ghazipur in the Northeast, Chaundauli in the east, Mirzapur in the south and Sant Ravidas Nagar in the west. The total area of district is 1526.36 sq. km, supporting a population of 31.48 lakh persons. This district is densely populated, with 2063 person per square km, as against the state average 689 person per square km. This district is divided into eight blocks namely, Baragaon, Araziline, Chiraigoan, Cholapur, Haruha, Kashi Vidhya Pith, Pindra and Sewapuri.

Varanasi is often said to be located between two confluences: one of the Ganges and Varuna, and other of the Ganges and Assi, (Assi having always been a rivulet rather than a river.) The distance between these two confluences is around 2.5 miles (4.0 km), and religious Hindus regard a round trip between these two places—a *Pancha-kroshi Yatra* (a five mile (8 km) journey) ending with a visit to a *Sakshi Vinayak Temple* as a holy ritual.

4.4 Climate

Varanasi experiences a humid subtropical climate (Koppen climate classification *Cwa*) with large variations between summer and winter temperatures. Summers are long, from early April to October, with intervening monsoon seasons and are also extremely hot, even by South Asian standards. The temperature ranges between 22°C – 46°C (72°F – 115 °F) in the summers. Winters in Varanasi see very large diurnal variations, with warm days and downright cold nights. Cold waves from the Himalayan region cause temperatures to dip across the city in the winter from December to February and temperatures below 5° C are not uncommon. The average annual rainfall is 1,110 mm (44 in). Fog is common in the winters, while hot dry winds, called loo, blow in the summers.

Through a combination of water pollution, new constructions of upstream dams, and increase in the local temperature, the water level of the Ganges has recently gone down significantly, and small islands have become visible in the middle of the river.

4.5 Demographics

The population of Varanasi urban agglomeration in 2011 was 1,371,749; the sex ratio was 879 females every 1000 males. As per 2011 census, population stands at 3,138,670. However, the area under Varanasi Nagar Nigam has a population of 1,100,748 with the sex ratio being 883 females for every 1000 males. The literacy rate in the urban agglomeration is 77% while that in the municipal corporation area is 78%. Approximately 138, 000 people in the municipal area live in slums.

4.6 Economy

4.6.1 Weaving

The most extravagant Banarasi saris use silk and gold-wrapped silk yarn with supplementary weft brocade. Varanasi has several small cottage industries, including producing of Banarasi saris, which are a regional type of sari made from silk. The city also produces carpets and handicrafts. According to some writers, Varanasi has a rather high rate of Child labour given the unorganised nature of small scale industries.

As of 2009, there are an estimated 300,000 weavers in Varanasi. Numerous weavers have lost work or moved elsewhere as saris become less popular in India and more imported saris impact the market.

Varanasi saris are adorned with intricate designs and zari embellishments making it popular during traditional functions and weddings. Earlier, the embroidery on sarees were often done with threads of pure gold. In 2009, weaver associations and cooperatives together secured Geographical Indication (GI) rights for 'Banaras Brocades and Sarees'.

4.6.2 Agriculture

Varanasi produces large quantities of langra mangoes, which are variety developed in the area. Banarasi paan (betel leaf) and khoa (a milk product) are popular, and the related small-scale industries employ many people.

4.7.3 Manufacturing

Indian Railways runs a major diesel locomotive factory in Varanasi, Diesel Locomotive Works (DLW). BHEL, a large power equipment manufacturer, also runs a plant here.

According to Macaulay, Varanasi was the "city which, in wealth, population, dignity and sanctity was among the foremost in Asia". He described the commercial importance saying "from the looms of Benaras went forth the most delicate silks that adorned the halls of St. James and of Versailles.

4.7.4 Tourism

Varanasi is a noted centre for silk weaving and brassware. Fine Silks and Brocaded fabrics, Exquisite Saris, Brassware, Jewellery, Woodcraft, Carpets, Wall hangings, Lamp shades and masks of Hindu and Buddhist deities are some of Varanasi's shopping attractions. The main shopping areas include the Chowk, Gyan Vapi, Vishwanath Gali, Thatheri Bazar, Lahurabir, Godoulia or DashswamedhGali and Golghar. Besides the illustrious and fine silks and brocaded fabrics, one can also buy shawls, carpets, wall hangings, Zari work; stone inlay work, glass beads and bangles, masks of Hindu and Buddhist deities and lampshades. However, one has to be on watch while buying silk saris and beware of the imitations that are much cheaper than the real silk ones but are not so easy to distinguish.

One can also buy 'kamandalam' or brass water pot from Varanasi, which is often used by saints to carry water. People buy bottled 'Ganga jal' or jerrycans from the riverbank too for religious purposes or to be used as Holy Water in various rituals. Besides, people can also take water of the Ganges themselves from the river. Assi Ghat, a midway point between

Godaulia in the heart of downtown and youth culture of Benares Hindu University is also a major tourist point.

Keeping a pace with the modern world, the ancient city has paved way for malls and multiplexes. The prominent ones being IP Mall in Sagra and JHV Mall in the Varanasi Cantonment area.

(Source: <http://en.wikipedia.org/wiki/Varanasi>)

Table: 4 Varanasi district profile at a glance

Items		Characteristics	Value
1.	Areas		
	1.1	Geographical area (Sq km)	1526.56
	1.2	Forest (ha)	712
	1.3	Net sown area (ha)	113.946
	1.4	Total cropped area (ha)	157.096
	1.5	Cropping intensity (%)	138%
	1.6	Fallow land (ha)	2587
	1.7	Land not available for cultivation	10003
2.	Administrative		
	2.1	No of block	8
	2.2	No of village (inhabited)	1262
	2.3	No of villages (electrified)	728(57.68%)
	2.4	No of villages with portable water supply	1262(100%)
3.	Rainfall (cm)		
	3.1	Normal	1019
	3.2	Actual (2011)	745
	3.3	Actual(2013)	737
4.	Agro-climatic zone		Eastern plain region
5.	Population (000)		
		Total	3147
		Male	1650.14
		Female	1497.79
		Population below poverty line (families)	62921

6	Literacy (%)		
		Total	67.09
		Male	83.66
		Female	48.59
7.	Credit infrastructures		
		Nationalized bank branches	163
		Regional rural Bank	36
		Cooperative Banks	14
		Cooperative and Village Development Bank.	2
8.	Agriculture allied work forces		
	8.1	Cultivators	207666
		Small and Marginal farmers	195581
		Agricultural laborers	102573
		Artisans	92567
		Others workers	303283
9.	Agricultural support facilities		
	9.1	Seed/Fertilizer depots.(No.)	148
		Rural markets/Mandis	03
		Cold storage (No. / Capacity)	14 / 37217 MT.
		Rural Godowns (No./ capacity)	102 / 2400 MT.
10.	Irrigation		
	10.1	Net irrigated areas (ha)	99049
		By canals (ha)	11373
		By tube wells (ha)	85357
		By wells / ponds (ha)	2205
		By others Sources (ha)	98
	11.	fertilizer consumption (kg per ha)	403

Crop sector

Khariif, rabi and Zaid are three major cropping season on the district, with approx 0.99-lakh hectares or 87% of the net cultivated area in being irrigated. The agriculture potential of the district can be rated as high. The major crops grown in the district are wheat, paddy and pulses. Paddy, maize, jowar and pulses like arhar, urd are the principal crops grown during Rabi season. Paddy and Maize are the crops cultivated during Zaid season.

Major food and commercial crops: Wheat, paddy, sugarcane, potato and pulses

Major Horticultural crops: Mango, Guava, Aonla, Potato, Onion, Cauliflower, Cabbage, Tomato, Okra etc.

RESULT AND DISCUSSION

Present chapter has been devoted to the presentation of results and discussion on the finding of the study. The results shows seed replacement rate of Varanasi district. Regarding the demand and supply of seed, causes the low seed replacement rate and involve supply agency in Varanasi. The results are in accordance with the objectives of study been broadly discussed under the following heads:

1. To analyse the current status of paddy seed replacement rate in Varanasi District of Uttar Pradesh;
2. To study the different agency involved in the supply of paddy seed production and distribution
3. To analyse the demand and supply of paddy seed.
4. To find the causes of low paddy seed replacement rate.

5.1. Area and Production of Rice in India

The area and production of rice in India is over a period of time is presented in Figure 5.1. It is clear from the Figure 5.1 that the rice production in the country was increasing over a period of time. The rice production in the country was 70.2 million tonnes in 2002-03 and it was increased to the level of 104.65 million tonnes by the year 2013-14. The growth trend analysis suggests that production of the rice in the country was growing with a compound growth rate of 3.32 per annum during 2002-03 and 2013-14.

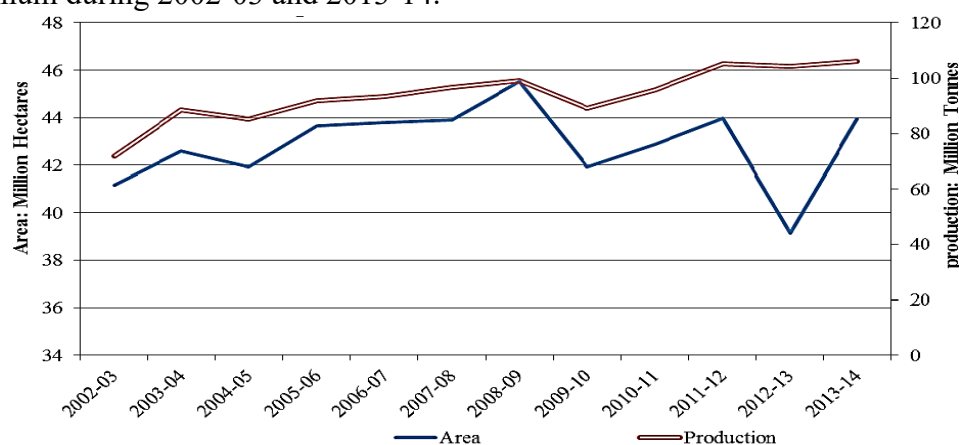


Fig. 5.1 Area and production of Rice in India

Total area under rice cultivation in the country was 41 million hectare during 2002-03 and it was increased to the level of 80.2 million hectare by the year 2013-14. The area under the rice production was showing up and down fall.

5.2 Major Rice producing Countries in the world.

China was the leading rice producer in the world followed by India, Indonesia and Bangladesh. The total rice production in China, India, Indonesia and Bangladesh was 141, 106, 39.8 and 38.5 million tonnes respectively during 2013-14 (United State Department of Agriculture).

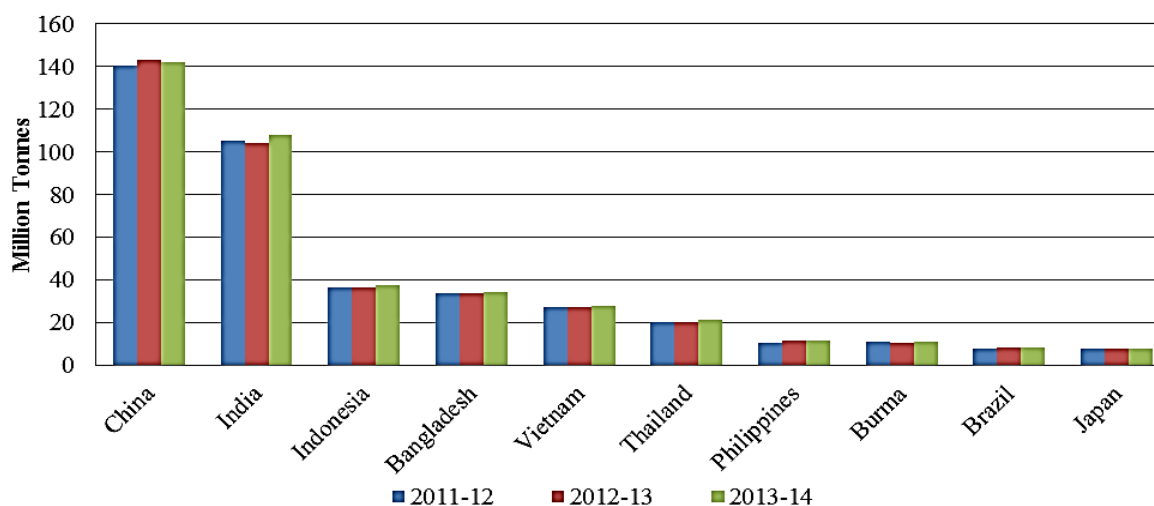


Fig. 5.2 Rice producing Countries in the world

Source: Directorate of Economics & Statistics (D&ES)

5.3 State-wise Paddy Production in India

The share of different rice producing India states for the year 2013-14 is presented in Figure 5.3. The highest rice producing state in India was West Bengal (13.8 per cent), followed by Uttar Pradesh (13.3 per cent) and Andhra Pradesh (12.2 per cent) and lowest rice producing state is Karnataka and contributing 3.7 per cent to India's total rice production (Indiastar.net.org).

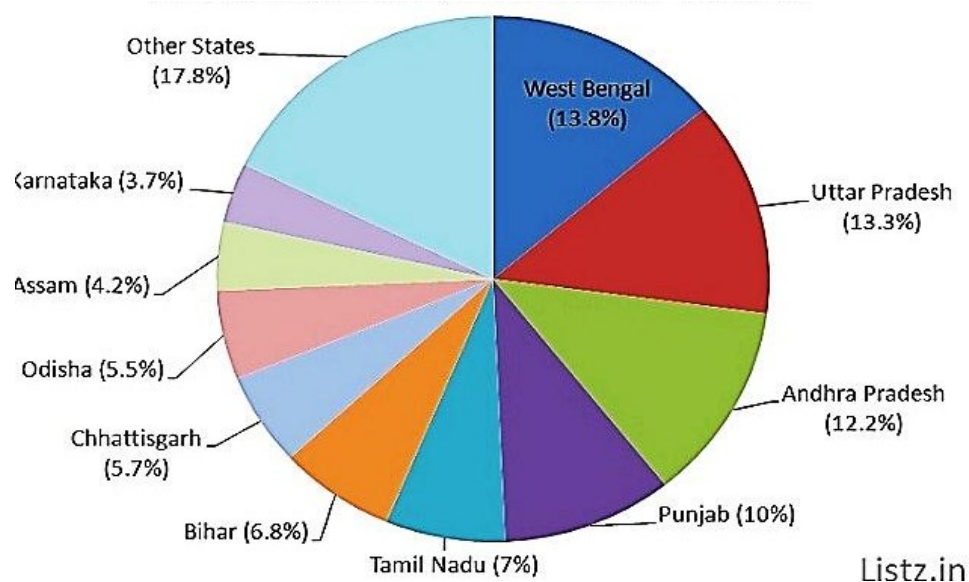


Figure 5.3 Contribution of state in India Rice production

5.2 Scenario of seed production in India

5.2.1 Quality seed production in India

Seed production in India for different types of seeds over different years is presented in Table 5.1. It is clear from the Table 5.1 that the seed production in India for breeder and certified seed production was lower during 2013-14 as compared to 2012-13 and 2014-15. The breeder seeds are used for the multiplication of foundation seed and foundation seeds are used for the production of certified seed. Generally, farmers were using certified seed for the crop production.

Table 5.1: Seed production in India (qts.)

Category	2012-13	2013-14	2014-15
Test stock	963.30	1058.2	1186.3
Breeder	3268.70	2370.4	2652.6
Foundation	42670.41	46135.50	49658.39
Certified	7,06,047.5	5,31,523.7	681390.23
Total	752949.91	5,81,087.9	734887.52

Source: U.P Seed Development Corporation

The crop-wise seed production in India over a period of time is presented in Table 5.2. It is clear from the Table 5.2 that the highest seed production was observed for the cereal production followed by the pulses and oilseed production. The lowest seed production was found for the fiber crops. It is clear from the Table 5.2 that, the seed production of cereal crops was 294532.82 quintal during 2012-13 and it was increased to the level of 380674.85 quintal by the year 2014-15.

Table 5.2: Crop wise seed production in India (qts.)

Group	2012-13	2013-14	2014-15
Cereals	294532.82	3,58,962.83	380674.85
Pulse	238664.73	116532.80	220698.99
Oilseeds	210794.07	92886.58	112998.36
Fibres	436.30	564.30	824.98
Other	8522.05	12141.45	19690.25
Total	752949.96	581087.96	734887.43

Source: : U.P Seed Development Corporation

5.2.2 Seed production in Utter Pradesh

The season-wise seed production for different years in Uttar Pradesh is presented in Table 5.3.

Table 5.3 Seed production in Utter Pradesh (qts)

Season	2012-13	2013-14	2014-15
Kharif	15992.58	13117.92	16352.58
Rabi	115763.61	154701.00	161351.00
Total	131756.19	167818.92	177703.60

Source: state seed corporation of India limited

It is clear from Table 5.3 that the seed production during the kharif season in 2013-14 was lower as compared to 2012-13 and 2014-15 seed production. In case of seed production for rabi season was showing increasing trend. The seed production during rabi season was more as compared to kharif season.

Objective I: To analyse the current status of paddy seed replacement rate in Varanasi district of Uttar Pradesh

The primary data was collected from the selected area from the farmers on size of land holding area under paddy cultivation, types of paddy seed used by the farmers etc. Based on the land holding of the sample farmers was categorized into three groups viz., marginal farmer (), small farmer and medium farmer .

Total area allocated by the marginal farmers under paddy cultivation in the study area was 25.94 hectares and total paddy seed used for the planting paddy was 1640 kgs. Out of this, highest share comes from the certified seed followed by own seed and lowest from the HYV seed (Table 5.4). In case of small farmers, total area allocated by the sample farmers for paddy cultivation in the study area was 18.37 hectare and total seed was used by the sample farmers was 720 kg. The highest quantity of seed used by the farmer was certified seed followed by own seed and lowest for HYV.

Table 5.4 Types of Seed Used by Sample Farmers

Sl. No.	Farmer category	Total sample farmer	Total area under paddy crop (ha)	Total seed used by farmer (kg)			Total seed (Kg)
				Certified seed	Own seed	HYV seed	
1	Marginal farmer	70	25.94	1301	279	60	1640
2	Small farmer	30	18.375	720	90	40	850
3	Medium farmers	0	0			0	
	Total	100	44.32	2021	369	100	2490

Source: Field survey, 2016

Seed Replacement Rate

The seed replacement rate by sample farmers in the study area is presented in Table 5.4. Overall seed replacement rate in the study area was estimated to be 76.00 per cent. The seed replacement rate for paddy crop in the study area by marginal farmers was estimated to be 48.924 per cent. In case of small farmers, the seed replacement rate was found to be 27.075 per cent .

Table 5.5: Seed Replacement Rate in Varanasi

Sl. No.	Farmer category	Area (Ha)	Seed Replacement Rate (%)
1	Marginal farmer	25.94	48.924
2	Small farmer	18.37	27.075
3	Medium farmers	0	0
	Total	44.32	76.00

Objective II: To study the different agency involved in the supply of paddy seed production and distribution.

Total paddy seed supplied by different agencies in Varanasi district was 9729 quintals in 2014-15 (Table 5.6). Out of total paddy seed supply in Varanasi, 46.49 per cent seed was supplied by private sector and remaining 53.51 per cent by the government agencies. Within the government agencies, UP seed corporation provides 28.77 percent seed, followed by Tarai seed corporation 11.36 percent, National seed corporation 8.22 percent and BHU 0.79 per cent. 28.77 percent paddy bought by the wholesalers and distributors in the district and they sold to the farmers. Beside this 4.37 per cent paddy was sold by the other agency.

Table 5.6: Paddy Seed Supply by Different Agencies in Varanasi district, 2014-15

S.N.	Agency	Quantity (qts)	Percentage
1	UP seed corporation	2800	28.77
2	Tarai seed corporation	1100	11.36
3	National seed corporation	800	8.22
4	Banaras Hindu University	70	0.79
5	Private organization	4515	46.49
6	Other	400	4.37
	Total	9729	100

Objective III: To analyse the demand and supply of paddy seed.

The supply of paddy seed for different agencies over a period of time was collected from the District Agriculture Office, Varanasi. Based on the area allocated by the farmers under paddy

cultivation and seed requirement, we estimated the total demand of paddy seed and total supply and gap between demand and supply. The paddy seed demand, supply and gap in varanasi district is presented in Table 5.7.

The standard rate of seed required for paddy is 40-45 kg per hectare depending on the crop variety and location. For the estimation of total paddy demand in Varanasi district, we considered two paddy seed rate i.e. 40 kg and 60 kgs (as farmers' point of view). From the Table 5.7 it is clear that the over the period of time the gap between demand and supply of paddy seed was reducing under the both seed rates. The paddy seed supplied by different agencies in the district was lower than the demand. In 2013-14, the gap between demand and supply of paddy seed in district was minimum (29.37 per cent) under the standard seed rate. But farmers were using large quantity of paddy seed, resulting to this the gap between demand and supply was 52 to 60 per cent. It means, farmers cannot replace paddy seed 100 per cent, because seed availability is lower than the demand. Therefore if we want to increase seed replacement rate in the district, than government should increase the supply of paddy seed in the district.

Table 5.7: Demand and supply of paddy seed

Sl. No.	Year	District area under paddy (Hectares)	Paddy seed Supplied by different agencies (Quintal)	Paddy seed demand and gap (@ 40 kg seed rate)			Paddy seed demand and gap (@ 60 kg seed rate)		
				Demand (Quintal)	Gap (Quintal)	Gap (Per cent)	Demand (Quintal)	Gap (Quintal)	Gap (Per cent)
1	2005-06	50124	9217	20049.60	10832.6	54.03	30074.40	20857.4	69.35
2	2006-07	49779	9365	19911.60	10546.6	52.97	29867.40	20502.4	68.64
3	2007-08	50514	8830	20205.60	11375.6	56.30	30308.40	21478.4	70.87
4	2008-09	48124	10744	19249.60	8505.6	44.19	28874.40	18130.4	62.79
5	2009-10	43971	12199	17588.40	5389.4	30.64	26382.60	14183.6	53.76
6	2010-11	49999	12888	19999.60	7111.6	35.56	29999.40	17111.4	57.04
7	2011-12	45096	11466	18038.40	6572.4	36.44	27057.60	15591.6	57.62
8	2012-13	48019	10206	19207.60	9001.6	46.86	28811.40	18605.4	64.58
9	2013-14	41352	11683	16540.80	4857.8	29.37	24811.20	13128.2	52.91
10	2014-15	43380	9729	17352.00	7623.0	43.93	26028.00	16299	62.62

Source: for area Directorate of Economics & Statistics (D&ES)

Source: for supply District agriculture officer Vikas Bhawan Varanasi up

Objective IV: To find the causes of low paddy seed replacement rate.

Number of generations which the seed could use from the previous crop is one of the important aspects of crop productivity. Deterioration in seed quality may occur due to exposure of paddy seed to adverse conditions like to deteriorate physical admixtures, loss of genetic vigour and germination power. Admixture may occur in the field, at the threshing yard or even during storage when seeds of other crops get mixed with the variety. Further, the germination power may go down due to physical damage through insect and microorganism infestation, breakage of grains, prolonged seed quality results in lower productivity per unit area. Therefore, it is necessary to replace paddy seed in every three years to get more production. The major reasons for low seed replacement rate of paddy as observed during the study were mentioned below.

1. Lack of awareness about Seed replacement

Most of the farmers did not aware about the seed replacement. Again, most of the farmers did not interest to purchase paddy seed. They also think that their own seeds are the best one since these are selected and preserved through aged old practices. They are not aware about the benefits of new seed. Therefore, they used the same seed year after year without replacing the seed. They go for replacing seed only when farmers having shortage of seed due to some reason and seed was purchased by the other farmers, whose seeds are of the same qualities. Therefore, SRR was not maintained properly. Singh and Kumar (2014) also reported that lack of awareness with regard to adaptability of improved variety of seeds is a common issue.

2. High cost of quality seeds

The price of quality seeds comparatively higher than the traditional variety as quality seed production is a specialized activity. Quality seed production is more or less a costly process. Therefore, the price of certified seed is higher and it is not affordable by the most of the farmers especially in case of marginal and small farmers because their economic status are not good. Therefore, farmers are forced farmers to use own seed.

3. Inadequate supply of seed

Due to inadequate supply of certified seed, farmer used same paddy seed year after year. The seed distributors are often few due to which it is difficult for farmers to get quality seed on timely. Seed certification programme or quality seed production is not in large scale due to which quality seed is not adequately available in the local area.

4. The importance attached to traditional varieties

Due to various reasons, farmers preferred traditional varieties. For various cultural occasions, farmers need traditional varieties. Besides this, as coping mechanism against natural calamities like drought, flood, etc. they also preferred this. Since these are not certified seeds, so farmers always retained, such seed for future used. This is also a one of the reasons of low seed replacement rate. Singh and Kumar (2014) also reported that the level of awareness of suitable and adaptable HYV variety seeds in Adiwasis community is very low and farmers mostly use desi (traditional) varieties of rice seeds.

5. Economic status of the farmer

One of the reasons of low seed replacement rate is the economic status of farmers. It was observed that there is a direct relationship between economic status and seed replacement. It was seen that farmers, those having large land holding generally purchase certified seed, though it may not be in recommended interval and could purchase quality seed from agencies even it was at distance place. For them, price and transportation cost were not a matter. Verma and Sidhu (2009) reported that there was a direct relationship between seed replacement rate and farm size. Too much dependency on farm saved seeds: It was observed that the main sources for paddy seed is self-retained seed. Therefore, farmer depend too much farm saved seed for planting next year. So, most of the farmers did not prefer for purchasing of certified paddy, which lower the seed replacement rate.

6. Traditional way of cultivation

Farmers continue the same practices for seed selection and cultivation, i.e. using of own seed. Most of the cases, new seed was received by farmers when Govt. Dept. supplies seed material either free of cost or at subsidized rates. The farmer got the pure or improved varieties for seed material. In this way, some SRR was made in the case of paddy. However, if farmers satisfied with the variety then they again repeat the same practice by retaining their own seed.

7. Lack of extension services

Due to poor extension services, they do not get aware about the benefit of seed replacement ratio. It was observed that no effort was made to make farmer aware about SRR. Very little training was given to farmers in this aspect, due to which farmers did not get enough information about it. Many agencies did not supply seed in time, so farmers cultivated their land with their own seed. Poor farmers also hesitated to cultivate with seeds supplied by government organizations due to a history of poor quality seed supplied by such agencies. According to Rawat (2014) weak extension machinery is also responsible for low seed replacement rate.

8. Adoption of a new variety

It is observed that the adoption of a new variety is very slow. It is observed that most of the farmer of a community adopts a variety when more than half of farmers adopted it due to which Seed Replacement Rate was low.

9. Isolated from market services

For paddy seed in Uttar Pradesh, generally U P Seed Corporation, different Krishi Vigyan Kendra, Regional Research Station and Agricultural University are the main sources. However, they have no retail outlet at farmers' doorsteps. These are located either in the district headquarter or in the distance places. Due to lack of transportation facility or transportation cost, farmer found it difficult to purchase seed from these organizations.

SUMMARY AND CONCLUSION

Paddy is one of the most important staple food crop grown and consumed by the population of Varanasi district of Uttar Pradesh. In general, farmers of the district growing paddy under the irrigated condition and farmers were getting lower crop yield due to the non-adoption of improved agronomic practices for paddy production including less seed replacement. The seed replacement of crop can enhance the crop production by 10-20 per cent without any change of other inputs of crop production. Present study was an attempt to find out the seed replacement rate in Varanasi districts of Uttar Pradesh. The objectives of the present study was as follows:

- (1) To analyse the current status of paddy seed replacement rate in Varanasi District of Uttar Pradesh;
- (2) To study the different agency involved in the supply of paddy seed production and distribution.
- (3) To analysis the demand and supply of paddy seed.
- (4) To find the causes of low paddy seed replacement rate.

Uttar Pradesh State was purposively selected for the present study. The Uttar Pradesh has 75 districts. Among these districts, Varanasi district was selected purposively for present study. There are 8 development blocks in Varanasi district namely Chiraigaon, Arajiline, Baragaon, Cholapur, Harahua, Kashi Vidyapeeth, Pindra, and Sevapuri. Among the eight development block, Baragaon development block was selected purposely, because Baragaon development block was having highest area and production of rice as compared to other development block of the district. A list of all rice growing village was prepared and five villages out of hundred villages were selected purposely. The criterion for selection of village was that the village having highest area under paddy cultivation. These five villages were Fattepur, Kharawan, Eshipur, Devchandrapur, Namapur. A list of rice growers from each selected village was prepared separately and rice growers were categorized into three groups based on their land holding. These groups are: [1] Marginal size group [2] Small size group and [3] Medium size group . From the each village 20 samples were selected proportionately using sample random sampling. Total 100 rice growers were selected for primary data collection.

Overall seed replacement rate in the study area was estimated to be 76.00 per cent. In case of marginal farmer, the paddy seed replacement rate was estimated to be 48.924 per cent. In case of small farmers, the seed replacement rate was found to be 27.075 per cent,.

Total paddy seed supplied by different agencies in Varanasi district was 9729 quintals in 2014-15. Out of total paddy seed supply in Varanasi, 46.49 per cent seed was supplied by private sector and remaining 53.51 per cent by the government agencies. Within the government agencies, UP seed corporation provides 28.77 percent seed, followed by Tarai seed corporation 11.36 percent, National seed corporation 8.22 percent and BHU 0.79 per cent. 28.77 percent paddy bought by the wholesalers and distributors in the district and they sold to the farmers. Beside this 4.37 per cent paddy was sold by the other agency.

The standard rate of seed required for paddy is 40-45 kg per hectare depending on the crop variety and location. For the estimation of total paddy demand in Varanasi district, we considered two paddy seed rate i.e. 40 kg (standard seed rate) and 60 kgs (as farmers' point of view) per hectare. Total seed requirement for the paddy under the both seed rate was estimated to be 17352 and 26028 quintal under both seed rate respectively during 2014-15. The gap between standard seed rate (40 kg per hectare) and farmers point of view (60 quintal per hectare) was estimated to be 7623 and 16299 quintal respectively during 2014-15.

The major reasons for low seed replacement rate of paddy as observed during the study was lack of awareness about seed replacement, high cost of quality seeds, inadequate supply of seed, the importance attached to traditional varieties, economic status of the farmer, traditional way of cultivation, lack of extension services, adoption of a new variety, and isolated from market services etc.

Policy Implications

Based on the finding of study, the policy implication of study are:

1. Government should supply more improved seed in the Varanasi district, so farmers can get sufficient seed to replace their old seed every year or every two year;
2. Government should provide the subsidy on the paddy seed, so farmers of the district can adopt it and replace seed as and when they require;
3. Extension workers should motivate farmers for replacement of paddy seed to harness more crop yield.

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