TECHNOLOGY UTILIZATION BEHAVIOUR OF PADDY GROWERS IN SINDHUDURG DISTRICT OF MAHARASHTRA STATE

By

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B. Sc. (Agri)

DEPARTMENT OF EXTENSION EDUCATION
FACULTY OF AGRICULTURE
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DAPOLI - 415 712, DIST. RATNAGIRI (M.S.)

MAY, 2019

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A thesis submitted to the

DR. BALASAHEB SAWANT KONKAN KRISHI VIDYAPEETH, DAPOLI

(Agricultural university)

Dist. Ratnagiri (Maharashtra state), India

In partial fulfilment of the requirements for the degree of

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CERTIFICATE

This is to certify that the thesis entitled **"TECHNOLOGY UTILIZATION BEHAVIOUR OF PADDY GROWERS IN SINDHUDURG DISTRICT OF MAHARASHTRA STATE."** submitted to the Faculty of Agriculture, Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli, Dist. Ratnagiri, Maharashtra state in partial fulfillment of the requirements for the degree of **MASTER OF SCIENCE (AGRICULTURE)** in **EXTENSION EDUCATION**, embodies the results of the piece of *bona-fide* research carried out by **Mr. Ambarish Dhareppa Hattalli** under my guidance and supervision. No part of this thesis has been submitted for any other degree or diploma. All the assistance and help received during the course of investigation and the sources of literature have been fully acknowledged by him.

Place: Dapoli
Date :

(B. N. Sawant)
Chairman,
Advisory Committee
and
Research Guide

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In everyone's life, the day arises when one has to mould feeling into words. Sometimes the words become unable to express the feelings of the mind; because feelings of the heart are beyond the reach of the words when I approach the completion of this manuscript, numerous memories gush through my mind which are full of gratitude to those who stood with me at various stages of my research work and throughout of my life, suddenly brim my heart. Every requires someone to love, inspire, care and motivate. I am thankful to the CREATOR that the enriched my life with such superb people and this is one of the rare chances to say THANKS, express my gratitude, respect and love to these people, who enchanted and mesmerized me by their talent, skill, knowledge and care in every step of my life.

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THESIS ABSTRACT

The study was conducted in Kudal, Kankavali, Malvan and Sawantwadi tahsils of Sindhudurg district of Maharashtra state. The sample was constituted 120 paddy growers drawn from twenty villages. The respondents were interviewed with the help of a specially designed schedule. The ex-post facto research design was used for the present study. The analysis of data revealed that majority of the respondents were middle age group, moderately educated, medium level of farming experience, marginal land holding, medium area under rice cultivation, medium annual income, medium social participation, extension contact, economic motivation and ‘medium’ knowledge level. The data regarding technology utilization behaviour of paddy growers revealed that majority of the respondents had ‘medium’ technology utilization behaviour of the selected agricultural technologies of paddy crop. The data regarding practice-wise tehnology utilization behaviour revealed that the respondents had ‘full’ technology utilization behaviour of ‘use high yielding variety’, ‘one

ploughing before or after first rain', 'use quality seed', 'transplanting of seedling at proper age reduces the incidence of pest', 'harvest the crop at 90 per cent grain maturation and plants are still green', 'dry under sun for 2 days after harvest in the field', 'before storage, dry grains for 3-4 days under sun'. The 'partial' technology utilization behaviour practices were 'maintain recommended plant population during transplanting', 'apply 40 kg N, 50 kg P and 50 kg K/ha as a basal dose during transplanting'. The association between profile of paddy growers and their technology utilization behavior namely, area under rice cultivation, rice yield, annual income, experience of rice cultivation, age, farming experience, land holding, area under rice crop, social participation, extension contact and economic motivation and their technology utilization behavior of paddy growers was non-significant. However, the association of education, annual income with technology utilization behavior of paddy growers was significant. Major constraints faced by respondents in paddy cultivation were high cost of inputs, lack of knowledge about recommended plant protection practices. To minimize the constraints in technology utilization (adoption) of recommended paddy production technology majority of the respondents suggested that, need to increase the minimum support prize of paddy, seeds of resistant variety should be available to the farmers at tahasil level respectively.

Chapter I

INTRODUCTION

Rice (*Oryza sativa L.)* is one of the important cereal crops of the world and forms the staple food for more than 50.00 per cent of population. It is the most important food crop of the world, next to wheat for human consumption. Rice has shaped the culture, diets and economic of thousands of millions of peoples. For more than half of the humanity "rice is life". Considering its importance position, the United Nations General Assembly, in a resolution declared the year of 2004 as the "International Year of Rice", which has tremendous significance to food security. It very eloquently upheld the need to heighten awareness about the role of rice in alleviating poverty and malnutrition (Barath and Pandey, 2005).

The largest three rice exporting countries are India (12.5million tons), Thailand (10.2 million tons) and the Vietnam (6.7 million tons), while the largest three rice importers are China (5.5 million tons), Nigeria (2.6 million tons) and European Union (1.9 million tons). China (210.1 million tons), India (104.3 million tons) and Indonesia (74.2 million tons) are the top three largest producers of rice in the world (www.statista.com).

India is an important centre of rice cultivation and having largest harvesting area in the world. Two major rice varieties are grown worldwide are *Oryza sativa indica* and *Oryza sativa japonica* it owes their origins of domestication, independently, thousands of year ago. It historians believed that

the *indica* variety of rice was first domesticated in the area covering the foothills of the Eastern Himalayas (i.e. north-eastern India), stretching through Burma, Thailand, Laos, Vietnam and Southern China and the Japonica variety was domesticated from wild rice in southern China which was introduced to India before the time of Greeks. Chinese records of rice cultivation 4000 years back.

In India rice is grown in 43.86 million ha, the production level is 104.32 million tones and the productivity is about 2381 kg/ha (Anonymous, 2016). It is grown under diverse soil and climatic conditions the productivity level of rice is low compared to the productivity levels of many countries in the world. Also, about 90 % of the cultivated land belongs to marginal, small and medium farmers which are another constrain in increasing the productivity of rice in the country. It is, therefore, there is ample scope to increase the productivity of rice in the country.

In India, the highest area under paddy is in Uttar Pradesh (58.69 lakh ha), followed by West Bengal (53.86 lakh ha), Orrisa (41.66 lakh ha). Production-wise, West Bengal stands first (147.50 lakh tonnes), followed by Uttar Pradesh (122.21 lakh tonnes), Punjab (111.07 lakh tonnes). The highest yield is observed in the state of Punjab (3837.94 kg/ha), followed by Tamilnadu (3190.75 kg/ha) and Haryana (3112.67 kg/ha) (www.mapsofindia.com).

In Maharashtra rice is the second important crop of the people, which is grown over an area of 14.99 lakh hectares with an annual rough rice production

of 32.37 lakh tones. The average productivity of the state is 2.01 t/ha. Maharashtra ranks 13th place in rice production in country. The average productivity of the Maharashtra state is low as compared to other rice growing states viz. Panjab, Tamil Nadu, Haryana, Andhra Pradesh etc. The area (07.32 lakh ha) of rice crop is more in Vidarbha region. The highest productivity was observed in Konkan region i.e. 2.56 t/ha (3.65 t/ha for rough rice). Marathwada region is the non-traditional rice growing area. Due to the erratic and less rainfall in Marathwada region, the average productivity of rice crop is lowest i.e. 0.41 t/ha (0.59 t/ha for rough rice). (Thaware *et al*. 2015)

The Konkan region is a major rice producing area of Maharashtra. Nearly 4.006 lakh hectare area of Konkan is under rice crop with production of 11.27 lakh tones. The average productivity of the Konkan region is 2.81 tons per hectare. The Konkan region comprises five districts viz., Raigad, Palghar, Thane, Ratnagiri and Sindhudurg. The area under rice in Raigad districts is 1.25 lakh hectares with a production of 3.51 lakh tones of rice, which is the highest in Konkan region. Sindhudurg has highest productivity in Konkan region with 3.25 t /ha. (Thaware *et al*. 2015).

The post independent era has witnessed a spectacular progress in enhancing the production and productivity of rice, which heralded a new era of green revolution. During the period 1950-51 and 2001-2002, the area has increased by 31.0 million ha; to 44.6 million ha. Productivity by 668 kg/ha to 2086 kg/ha and production by 20.58 million tons to 90 million tons. Looking to the current rate of population growth, rice production has to be enhancing to

about 125 million tones by 2020. Therefore, rice farming and the whole rice sector have to be reoriented to face the future challenges and our farmers too have to change their mindset to turn rice cultivation into a lucrative economic product rather than simple food commodity. (www.cmie.com)

1.1 STATEMENT OF THE PROBLEM

Paddy is one of the important commercial crops of Sindhudurg district having with total area of 53395 hectares. Kudal, Kankavali, Malavan and Sawantwadi are major rice growing taluka of the district. Majority of the farmers in the area has undertaken the cultivation of paddy since a very long time. However, it is observed that recommended paddy production technology is not adopted by the farmers up to the extent for higher production. Socio-personal, economics and psychological attribute of the farmers influence for poor or higher technology utilization behaviour. Therefore, it is high time to assess the knowledge level and extent of utilization of the paddy production technology by the farmer specifically of Kudal, Kankavali, Malavan and Sawantwadi. Keeping this view in mind present study was entitled "Technology Utilization Behaviour of Paddy Growers in Sindhudurg District of Maharashtra State". With following specific objectives.

1.2 OBJECTIVES OF THE STUDY

1. To study the profile of paddy growers.
2. To assess the knowledge and technology utilization behaviour of paddy growers about paddy production technology.
3. To ascertain the association between profile and technology utilization behaviour of paddy growers.
4. To find out the constraints faced by the paddy growers in adoption of paddy production technology.
5. To seek the suggestions from paddy growers to minimize the constraints in adoption of paddy production technology

1.3 SCOPE OF THE STUDY

It is expected that this study will provide insight to the personnel engaged with the development of paddy growers to motivate them to increase technology utilization behaviour of improved practices. The study is focused on the socio-economic characters of the paddy growers as well as their knowledge and technology utilization behaviour status. It will be also useful to reveal certain factors and constraints responsible for the poor technology utilization behaviour of improved practices for paddy cultivation to take remedial measures to improve the technology utilization behaviour of improved practices. Moreover, findings available from this study will be of immense importance to the planners, extension workers, administrators, teachers and students of the extension education who are directly or indirectly engaged with the development of paddy cultivation technology.

Knowledge of new farm technology and its technology utilization behaviour presumed to be influenced by personal, social, economical and situational attributes of an individual which will help the extension personnel to approach farmers for stimulating interest and forming positive attitude towards technology utilization behaviour of new farm innovations. Information pertaining to constraints and suggestions regarding technology utilization behaviour of rice production technology will serve as a guideline in modifying and restructuring the future research and extension strategy.

It is hoped that findings of this study will also helpful to the programme planners, extension functionaries, teachers and students who are directly or indirectly connected with the development of farming community.

1.4 LIMITATIONS OF THE STUDY

Due to limited time and other resources available with investigator, the study was limited to four tahsils of the Sindhudurg district. Only 120 paddy growers from 20 villages in Sindhudurg district were included in the study.

CHAPTER II

REVIEW OF LITERATURE

A comprehensive review of literature is an essential part of any scientific investigation. The main purpose of this chapter is to put forth findings of the past research studies, which are related to the present investigation. It also helps the researcher to conclude and compare findings of his/her research with past research works to avoid duplications. Moreover, it also aids in making clear some concepts regarding the study. Thus, to develop a conceptual framework and to find out appropriate design for the study, a review of past studies was carried out. The references directly related to the present research project were few in number. The literature having direct bearing on different aspects of present study was limited therefore, the references having indirect bearing were also reviewed and presented in ascending of the years of work done by previous social researchers. This chapter is divided under the following heads.

2.1 To study the profile of paddy growers.

2.2.1 Knowledge of paddy growers about paddy production technology.

2.2.2 Technology utilization behaviour of paddy growers about paddy production technology.

2.3 To ascertain the association between profile and technology utilization behaviour of paddy growers.

2.4 To find out the constraints faced by the paddy growers in adoption of paddy production technology.

2.5 To seek the suggestions from paddy growers to minimize the constraints in adoption of paddy production technology.

2.1 Study the profile of paddy growers.

2.1.1 Age:

Choudhary (2010) while studying on ‘Pesticide using behavior of paddy growers in Khambhat taluka of Anand district’ indicated that less than half (45.83 per cent) of the paddy growers belonged to 'middle’ age group, followed by ‘old’ age (33.33 per cent) and ‘young’ age (20.84 per cent) respectively.

Bhosale (2010) in his study on, ‘Participation of rural youth in paddy farming in Anand district of Gujarat state’ reported that three-fifth (60.00 per cent) of the paddy growers belonged to ‘middle’ age group followed by ‘old’ age (15.00 per cent) and ‘young’ age group (25.00 per cent) respectively.

Thakur (2011) while studying ‘Influence of social values on adoption of the recommended rice cultivation practices’ observed that majority (81.66 per cent) of the paddy growers respondents belonged to ‘middle’ age category, while 9.17 per cent each of them were in ‘old’ age and ‘young’ age category.

Singh and Pandya (2012) in his study on, ‘Knowledge and adoption behaviour of paddy growers’ reported that maximum number of the paddy growers (39.17 per cent) were in ‘middle’ age group followed by ‘old’ age group (32.50 per cent) and ‘young’ age group (28.33 per cent) respectively.

Maheriya (2013) in his study on ‘Technology utilization behaviour of paddy growers in Annand district of Gujarat state’ observed that majority (65.83 per cent) of the respondents of paddy growers were from middle age group, where as one fourth (25.00 per cent) of them where belongs to old age groups and very few (09.17 per cent) where in young age group.

Wadekar (2013) while studying ‘Adoption of rice cultivation practices by Warli tribal farmers from Thane district of Maharashtra’ observed that 66.66 per cent of the paddy growers belonged to ‘middle’ age category, while 16.67 per cent each of them were in ‘old’ age and ‘young’ age category.

Babu (2014) in his study on ‘A study on knowledge and adoption levels of paddy farmers in east Godavari district of Andhra Pradesh’, observed that majority (56.67 per cent) of the respondents were found in the ‘middle’ age category, followed by 31.67 per cent in the ‘old’ age category, and only 11.66 per cent fell under ‘young’ age category.

Karangami (2017) in his study on ‘Adoption of recommended rice cultivation practices by the farmers from Palghar district’ revealed that more than two third 67.50 percent of the respondents belonged to ‘middle’ age category, while 17.50 per cent of the respondents were in ‘young’ age and 15.00 per cent of the respondents were in ‘old’ age category. The average age of the respondents was 51.24 years.

2.1.2. Education

Krishna *et al*. (2007) in their study on 'Dynamic adoption of recommended rice production technologies among migrant farmers' revealed that 26.67 per cent of the respondents had education up to 'primary school', while 20.00 per cent respondents were 'able to read and write', 18.00 per cent had completed education up to 'middle school' and 14.67 per cent had completed education up to 'high school' level, 14.66 per cent of total population of respondents was 'illiterate', and only 6.00 per cent of the respondents were 'able to read' only.

Tambat (2007) in his study 'A study on knowledge and adoption of recommended cultivation practices by the summer rice growers' observed that a maximum number (29.33 per cent) of the respondents had 'secondary' education, while in category of 'pre-primary' education were 26.00 per cent respondents followed by 'primary' (22.67per cent), 'higher-secondary' (10.00 per cent), 'college' level (6.67 per cent), and 'illiterate' category (05.33 per cent) respectively.

Bhosale (2010) indicated that more than one-third (36.67 per cent) of the paddy growers had education up to 'secondary' level followed by 'college' and above level (28.65 per cent), 'higher secondary' level (25.51 per cent) and 'primary' level of education (09.17 per cent) respectively.

Choudhary (2010) found that slightly more than two-fifth (41.66 per cent) of the paddy growers had obtained 'secondary' level of education and 'primary' level of education was among 19.18 per cent, followed by nearly an

equal number 19.16 per cent and 20.00 per cent of them who had ‘higher secondary’ and ‘college’ level of education, respectively.

Maheriya (2013) indicated that half (50.84 per cent) of the respondent paddy growers were educated up to primary level were as 35.84 per cent and 09.16 per cent of them had secondary to higher secondary level and above higher secondary level of education, respectively. It is interesting to note that very few (04.16 per cent) of the respondents were illiterate.

Wadekar (2013) observed that maximum number (28.34 per cent) of the respondents had ‘secondary’ education. The respondents in the category of ‘illiterate’ were 25.00 per cent followed by ‘pre-primary’ (16.67 per cent), ‘primary’ (16.67 per cent), ‘higher secondary’ (9.16 per cent) and ‘graduation’ (4.16 per cent). The average educational level of the respondents was 6th std indicating primary level.

Karangami (2017) observed that maximum number (39.16 per cent) of the respondents had ‘secondary’ education. The respondents in the category of ‘pre-primary’ education were 19.16 per cent, followed by ‘higher secondary’ (15.84per cent), ‘primary’ (10.00 per cent), ‘illiterate’ (09.17 per cent), and ‘graduate’ (06.67 per cent). The average educational level of the respondents was 7th std. indicating primary education.

2.1.3 Farming experience

Patel (2006) in his study on ‘Attitude of paddy growers towards the use of pesticides in Tarapur, Sojitra and Petlad talukas of Anand district’ indicated that vast majority (89.17 per cent) of the respondents were found with ‘medium’ level of experience in paddy cultivation, followed by 10.00 per cent and 0.83 per cent with ‘high’ and ‘low’ level of experience in paddy cultivation, respectively.

Parmar (2006) in his study on, ‘A study on knowledge and extent of adoption of paddy growers about recommended paddy production technology in Khambhat taluka of Anand district’ indicated that majority (85.00 per cent) of the paddy growers had ‘medium’ level of experience in paddy cultivation.

Rabari (2006) in his study on, ‘Adoption of paddy recommended technology by paddy growers in Anand district of Gujarat state’ reported that majority (54.00 per cent) of the paddy growers had ‘medium’ level of farming experience, whereas 26.00 and 20.00 per cent possessed ‘low’ and ‘high’ level of farming experience in rice crop cultivation, respectively.

Tambat (2007) reported that the majority (67.34 per cent) of paddy growers belongs to ‘medium’ level of farming experience, whereas 23.33 and 09.33per cent of paddy growers had ‘low’ and ‘high’ level of farming experience, respectively.

Choudhary (2010) observed that exactly half (50.00 per cent) of the paddy growers were found with ‘low’ farming experience followed by 41.67 per cent and 8.33 per cent of them had ‘medium’ and ‘high’ level of farming experience, respectively.

Maheriya (2013) disclosed that a nearly half of the respondents (45.84 per cent) and 6 to 10 year experience followed by 11 to 15 years (33.33 per cent) and above 15 years (12.50 per cent) experience in paddy cultivation whereas only 08.33 per cent) of them had up to 5 years farming experience.

2.1.4 Land holding

Parmar (2006) revealed that two fifth (40.00 per cent) of the paddy growers had 2.0 to 4.0 ha. of land holding, whereas, 26.66 per cent of them were ‘big’ farmers who possessed above 4.0 ha. of land remaining were ‘marginal’ and ‘small’ farmers who possessed less than 1.0 ha and 1.01 to 2.0 ha. of land, respectively.

Bhosale (2010) in his study ‘Participation of rural youth in paddy farming in Anand district of Gujarat state’ revealed that about two fifth (38.33 per cent) of the paddy growers were ‘small’ farmers, remaining of them were ‘medium’ (29.18 per cent), ‘large’ (23.33 per cent) and ‘marginal’ (09.16 per cent) farmers.

Mahatab (2010) in his study on ‘A study on knowledge and adoption of aerobic rice growers in Eastern dry zone of Karnataka State’ reported that more than half (68.89%) of the aerobic rice growers had ‘big’ land holding followed

by 16.67 per cent having ‘medium’ sized land holding and 14.44 percent with ‘lower’ sized land holding.

Sasane *et al.* (2012) in his study entitled ‘Knowledge and adoption of Paddy cultivation practices among farmers in North Kashmir’ concluded that 51.25 per cent of paddy growers were from ‘medium’ land holding category, 40.00 and 8.75 per cent from ‘big’ and ‘small’ land holding category.

Maheriya (2013) revealed that 25.83 per cent of the respondents were small farmers having 1. 0 to 2.0 ha of land holding, followed by medium (44.17 per cent), large (20.83 per cent) farmers and marginal (09.17 per cent) respectively.

Babu (2014) reported that majority of the respondents were ‘semi-medium’ (32.50 per cent), ‘small’ (25.10per cent) followed by ‘marginal’ (15.80 per cent), and ‘medium’ (15.80 per cent). A meagre portion of them are having (10.80 per cent) medium land holding.

2.1.5 Area under rice cultivation

Tambat (2007) observed that maximum number (42.00 per cent) of the respondents had ‘medium’ area under rice cultivation, followed by 36.67 per cent of the respondents having ‘low’ area under rice cultivation. Only 21.33 per cent of the respondents had ‘high’ area under rice cultivation.

Manjunatha (2010) in his study on, ‘Knowledge and Adoption of plant protection measures by paddy growers of Raichur district’ reported that 32.57 per cent of the paddy grower belonged to ‘medium’ land holder category,

followed by ‘semi-medium’ land holders (23.43 per cent), ‘small’ land holders (17.72 per cent), ‘marginal’ land holders (14.28 per cent) and ‘big’ land holders (12.00 per cent) respectively.

More (2011) in his study on, ‘Factors influencing adoption of hybrid rice cultivation technology in Ratnagiri district’observed that majority paddy growers (64.00 per cent) had ‘medium’ area under hybrid rice cultivation, while 19.00 per cent and 17.00 per cent of the respondents were in the ‘high’ and ‘low’ category, respectively.

Dhenge (2013) in his study on, ‘Knowledge and adoption of integrated pest management practices by paddy growers’ observed that little more than one third (37.50 per cent) of the respondents were having area under paddy crop between 1.01 to 2 ha., followed by 30.83 per cent of the respondents having area under paddy cultivation between 2.01 to 4 ha. Nearly equal number of the respondents (28.34 per cent) cultivated paddy in below 1 ha. of land. Meagre respondents (03.33 per cent) possessed the area under paddy cultivation above 4.00 ha.

Karangami (2017) in his study on ‘Adoption of Recommended Rice Cultivation Practices by the Farmers from Palghar District’ observed majority (52.50 per cent) of the respondents had ‘medium’ area under rice cultivation, followed by 37.50 per cent having ‘low’ area under rice cultivation. Only 10.00 per cent of the respondents had ‘high’ area under rice cultivation. The average area under rice cultivation of the respondents was 1.34 ha. indicate small land holding.

2.1.6 Annual income

Pawar (2009) revealed that more than two-fifth (44.00 per cent) of the respondents of paddy growers had ‘medium’ level of annual income followed by 30.00 per cent and 26.00 per cent of them belonged to ‘low’ and ‘high’ level of annual income categories, respectively.

Bhosale (2010) reported that majority (44.29 per cent) of the paddy growers belonged to ‘medium’ income group, while 37.14 per cent and 18.57 per cent of the paddy growers belonged to ‘high’ and ‘low’ income group respectively.

Mahatab (2010) found that majority (60.00 per cent) of the aerobic rice growers belonged to ‘medium’ range of annual income followed by 33.33 per cent belonging to the ‘high’ income category and 6.67 percent with ‘low’ annual income.

Thakur (2011) in his study ‘Influence of social values on adoption of the recommended rice cultivation practices’ observed that about half (49.17 per cent) of the paddy growers were having ‘medium’ annual income, while 39.17 and 11.66 per cent of the respondents had ‘low’ and ‘high’ annual income, respectively.

Dhenge (2013) observed 37.50 per cent of the respondents were having area under paddy crop between 1.01 to 2 ha. 30.83 per cent having 2.01 to 4 ha. 28.34 per cent below 1 ha. of land and 03.33 per cent possessed above 4.00 ha.

Maheriya (2013) revealed that more than half (54.16 per cent) of the respondent farmers had more than 2 lakhs income whereas 26.67, 08.33, 06.67 and 04.17 per cent of the respondents were found in income group of Rs. 1.51 to Rs. 2 lakhs, Rs.1 lakhs to Rs.1.50 lakhs, Rs.81, 000 to Rs.1.00 lakhs and up to Rs 80,000, respectively.

Wadekar (2013) reported that 43.33 per cent of the rice grower farmers were having 'low' annual income, while 32.50 per cent and 24.16 per cent of the respondents had 'medium' and 'high' annual income, respectively.

2.1.7 Social participation

Bhosale (2010 reported that more than two fifth (42.50 per cent) of rural youth had membership in 'one' organization followed by 29.17 per cent, 23.33 per cent and 05.00 per cent who had membership in more than 'one' organization, 'no' membership in any organization and were holding position in organization.

Maheriya (2013) observed that more than half (54.17 per cent) of the respondent had membership in one organization whereas one forth (25.00 per cent) of them had membership in more than one organization and 14.17 per cent respondents had no membership in any organizations. Very few (06.66 per cent) of the respondents were position holders in various social organizations.

Babu (2014) revealed that little more than half (62.50 per ent) of the respondents had 'medium' level of social participation followed by 'low' (20.80 per cent) and 'high' (16.70 per cent) levels.

2.1.8 Extension contact

Deore (2006) in his study 'Study on awareness of farmers regarding organic rice cultivation practices' observed that about three-fourth (74.50) of the respondents had 'medium' extension contact, 14.50 per cent of the respondents had 'high' extension contact, while 11.00 per cent of the respondents had 'low' extension contact.

Tambat (2007) observed that more than one half (52.00 per cent) of the respondents had 'medium' extension contact, while 28.00 per cent and 20.00 per cent of the respondents had 'low' and 'high' extension contact, respectively.

More (2011) observed that majority (61.00 per cent) of the respondents had 'medium' extension contact, while 24.00 per cent of the respondents had 'high' extension contact, 13.00 per cent of the respondents had 'low' extension contact and only 2.00 per cent of the respondents had 'no' extension contact.

Thakur (2011) observed that majority (77.50 per cent) of the respondents had 'medium' extension contact; while 15.83 per cent of the respondents had 'low' extension contact and 6.67 per cent of the respondents had 'high' extension contact.

Wadekar (2013) noticed that majority (53.33 per cent) of the respondents had 'medium' extension contact; while 33.33 per cent of the respondents had 'low' extension contacts and 13.33 per cent of the respondents

had ‘high’ extension contact. The average extension contact score of the respondents was 4.5.

2.1.9 Economic motivation

Patel (2011) in his study on, ‘Attitude of paddy growers towards the use of pesticides in Tarapur, Sojitra and Petlad talukas of Anand district’ indicated that slightly more than half (51.67 per cent) of the respondents were belonged to ‘medium’ economic motivation. On the other hand, 40.00 per cent respondents were found having ‘high’ economic motivation. Remaining 08.33 per cent respondents had ‘low’ economic motivation.

Manjunatha (2010) indicated that majority of paddy growers were distributed in ‘medium’ (57.14 per cent) economic motivation category, followed by 25.71 per cent of ‘low’ category of farmers and rest 17.14 per cent of respondents distributed in ‘high’ economic motivation category, respectively.

Dhenge (2013) indicated that nearly one half of the respondents (58.83 per cent) were found in ‘medium’ category of economic motivation. As much at 23.33 per cent of the respondents found to be having ‘low’ level of economic motivation and 18.34 per cent of the respondents were found in ‘high’ level of economic motivation.

Maheriya (2013) noticed that nearly half (45.83 per cent) of the respondents had medium level of economic motivation. Whereas one fourth (25.00 per cent) of them had high level of economic motivation remaining

16.66 and 12.50 per cent of them had low and very low economic motivation respectively.

Gajbhiye (2014) in his study on 'Technological gap in relation to hybrid rice production practices among the hybrid rice growers of Rewa block of Rewa District M.P.' indicated that 49.17 per cent of respondents had 'medium' economic motivation, 33.33 per cent had 'low' economic motivation while 17.50 percent had 'high' economic motivation.

2.2.1 Knowledge of paddy growers about paddy production technology.

Parmar (2006) found that majority (60.00 per cent) of the paddy growers had 'medium' level of knowledge followed by 'high' (26.67 per cent) and 'low' (13.33 per cent) level of knowledge. Further he stated that, majority of the paddy growers possessed 'high' level of knowledge about paddy production technology viz: improved Varieties (100.00 per cent)), manual weed control (95.83 per cent) time of transplanting (79.16 per cent) and proper time of harvesting (75.00 per cent) It is interested to note that farmers had very 'poor' knowledge about seed treatment, chemical weed control and disease control.

Patel (2007) in his study 'Time lag in adoption of tissue culture raised paddy plants for middle Gujarat' reported that majority of the (77.50 per cent) of the paddy growers had 'medium' level of knowledge about recommended paddy production technology, whereas 15.00 and 07.50 per cent of them had 'high' and 'low' level of knowledge about recommended paddy production technology, respectively.

Khalje et al. (2008) in his study 'Knowledge and adoption of recommended package of practices for paddy crop' reported that majority (65.00 per cent) of paddy growers had 'medium' level of knowledge, followed by 20.83 per cent with 'low' and 14.17 per cent with 'high' level of knowledge about recommended practices of paddy crop.

Kirar and Mehta (2009) in his study 'Extent of knowledge of tribal farmers about rice production technology' reported that maximum number of the contact tribal farmers (51.67 per cent) had 'medium' knowledge level of recommended rice production technology, 33.33 per cent and 15.00 per cent of the farmers had 'low' and 'high' knowledge level of recommended rice technology respectively

Bhosale (2010) indicated that more than three fourth (77.50 per cent) of the Rural youth had 'medium' level of knowledge about recommended paddy Production technology, whereas, 15.00 and 07.50 per cent of them had 'high' and 'low' level of knowledge, respectively.

Thiyagarajan (2011) in his study 'Impact analysis of system of rice intensification (SRI) among the paddy farmers of Coimbatore District' revealed that majority of the respondents (78.30 per cent) had 'medium' level of knowledge followed by 19.20 per cent of the respondents with 'low' level and 02.50 per cent with 'high' level of knowledge in SRI cultivation.

Meena et al. (2012) in his study 'Knowledge level and adoption pattern of rice production technology among farmers' revealed that majority (70.00 per cent) of the farmers had 'medium' level of knowledge followed by 'low' and

‘high’ level of knowledge with 16.00 per cent and 14.00 per cent farmers, respectively.

Maheriya (2013) observed that 37.50 per cent of the paddy growers had average knowledge about paddy production technology. Whereas, 25.00, 16.66, 12.50 and 08.33 per cent of them had above average, high, low and very low level of knowledge about paddy production technology respectively.

2.2.2 Technology utilization behaviour of paddy growers about paddy production technology.

Parmar (2006) revealed that slightly more than two third (66.67 per cent) of the paddy growers had ‘medium’ extent of adoption of recommended paddy production technology followed by ‘high’ (17.50 per cent) and ‘low’ (15.83 per cent) extent of adoption of recommended paddy production technology. Further he observed that that, almost all the paddy growers had adopted technologies such as improved varieties, time of transplanting, manual weed control and harvesting followed by technologies adopted viz., organic manure (83.33 per cent), spacing (75.00 per cent), post harvesting technology (73.83 per cent), use of chemical fertilizer (68.33 per cent), irrigation management (65.00 per cent) and plant protection against pest control (50.00 per cent). It is also interested to not that very few (16.66 per cent) farmers adopted control measures against diseases incidents, but none of the respondents adopted seed treatment and chemical weed control.

Tambat (2007) observed that majority (80.00 per cent) of the respondents had ‘medium’ adoption of the recommended summer rice

cultivation practices, while 10.67 per cent and 9.33 per cent of the respondents had ‘high’ and ‘low’ adoption respectively.

Mahatab (2010) found that majority of farmers (56.67 per cent) belonged to ‘medium’ adoption category, whereas 22.22 and 21.11 per cent of the farmers belonged to ‘low’ and ‘high’ adoption categories, respectively.

Thakur (2011) noticed that more than half (57.50 per cent) of the respondents had ‘medium’ adoption of the recommended rice cultivation practices, while 23.34 per cent and 19.16 per cent of the respondents had ‘low’ and ‘high’ adoption, respectively.

Thiyagarajan (2011) revealed that nearly half of the respondents had ‘high’ level (48.40%) of adoption in the cultivation of paddy under SRI method followed by ‘medium’ (25.80%) and ‘low’ (25.80 per cent) levels of adoption.

Maheriya (2013) observed that 41.66, 25.00 and 16.66 per cent of the respondents were comes under the category of average, above average and high overall technology utilization behaviour in paddy cultivation. While equal (08.33 per cent) of each had very low and low technology utilization behaviour.

Wadekar (2013) observed that 70.83 per cent of the respondents had ‘medium’ level adoption of the selected agricultural technologies of rice crop, while 15.00 per cent and 14.17 per cent of the respondents had ‘high’ and ‘low’ level adoption, respectively.

2.3 Association between profile of the farmers and Technology utilization behaviour of paddy growers.

Profile of the farmers plays an important role for extent of knowledge about modern agricultural practices, as well as their adoption by the farmers.

2.3.1 Age and Technology utilization behaviour

Mate (2005) in his study on 'Study of knowledge and adoption of recommended paddy cultivation practices by the farmers in Pune district' reported that relationship between the age of paddy growers and their extent of adoption regarding recommended paddy cultivation practiceswas non-significant.

Parmar (2006) concluded that age of the paddy growers was significant but negatively correlated with their extent of adoption of recommended paddy production technology.

Rabari (2006) concluded that age of the paddy growers had negative but significant correlation with their extent of adoption of recommended paddy cultivation technology.

Tambat (2007) in his study on 'Knowledge and adoption of recommended rice cultivation practices by summer rice growers' observed that the association between age and extent of adoption was 'significant'.

Rathod (2009) in his study on, 'Adoption of recommended plant protection measures by paddy growers in Anand district of Gujarat state' reported that age of the paddy growers had negative but highly significant

relationship with extent of adoption of recommended plant protection measures.

Bhosale (2010) indicated that age of the paddy growers had positive and highly significant relationship with their extent of adoption of recommended paddy cultivation practices.

Gaikwad(2010) in his study on ‘A study of agricultural development of Sora tribes in Bolangair districts of Orissa state’ observed that association between age of the respondents and extent of adoption was positive but ‘non-significant’.

Maheriya (2013) observed that age of the respondent paddy growers had negative but significant relationship with their technology utilization behaviour.

Wadekar (2013) observed that the association between age of the respondents and extent of adoption was negative but significant at 5.00 per cent level of probability.

Karangami (2017) concluded that there was statistically non-significant association between age of paddy growers and adoption level of recommended rice cultivation practices.

2.3.2 Education and Technology utilization behaviour

Parmar (2006) concluded that education of the paddy growers was positive and significantly correlated with their extent of adoption of recommended paddy production technology.

Rabari (2006) concluded that education of the paddy growers had negative but significant correlation with their extent of adoption of recommended paddy cultivation technology.

Krishna *et al.* (2007) revealed that relationship between education and adoption of upland rice technologies was non-significant.

Tambat (2007 observed that the association between education and extent of adoption was ‘significant’.

Maheriya (2013) revealed that educational level of the respondent paddy growers had significant relationship with their technology utilization behaviour.

Wadekar (2013) observed that relationship between educational level and extent of adoption was positive and significant at 1.00 per cent level of probability.

Karangami (2017) indicated that there was non-significant association between education level of the studied paddy growers and their adoption level of recommended rice cultivation practices.

2.3.3 Farming experience and Technology utilization behaviour

Patel (2007) reported that farming experience of paddy growers had positive and significant correlation with their extent of adoption.

Tambat (2007) indicated that the association between farming experience and adoption of recommended cultivation practices by the summer rice growers was ‘significant’.

Bhosale (2010) indicated that farming experience of the paddy growers had positive and highly significant relationship with their extent of adoption of recommended paddy cultivation practices.

More (2011) concluded that the relationship between of the experience in hybrid rice cultivation and their adoption level was positive but non-significant.

Maheriya (2013) revealed that farming experience of respondent paddy growers had no any relationship with their technology utilization behaviour.

Karangami (2017) observed that there was significant association between farming experience of rice growers and their adoption level of recommended rice cultivation practices.

2.3.4 Land holding and Technology utilization behaviour

Pandey et al. (2004) in his study on ‘Constraints in adoption of recommended rice production technology among the Farmers of Chattisgad’ found that the association between size of land holding and adoption of

recommended rice technology among the farmers of Chhattisgarh was significant.

Parmar (2006) found that land holding of the paddy growers was positively and significantly correlated with their extent of adoption of recommended paddy production technology.

Bhosale (2010) indicated that size of land holding of the paddy growers had positive and highly significant relationship with their extent of adoption of recommended paddy cultivation practices.

Thiyagarajan (2011) found that the extent of adoption of SRI by farmers and their land holding were negatively and significantly related with each other.

Maheriya (2013) revealed that land holding of respondents had significant relationship with their technology utilization behaviour.

2.3.5 Area under rice crop and Technology utilization behaviour

Krishna *et al.* (2007) revealed that relationship between area under rice cultivation and adoption of the recommended rice production technologies among migrant farmers was significant.

Tambat (2007) observed that the association between area under rice cultivation and adoption of recommended rice cultivation practices of summer rice was ‘significant’.

More (2011) observed that the area under hybrid rice cultivation of the respondents and their adoption level of the respondents were negative and ‘non-significantly’ related.

Karangami (2017) revealed that there was significant association between area under rice cultivation of rice growers and their adoption level of rice among rice cultivation practicing farmers.

2.3.6 Annual income and Technology utilization behaviour

Parmar (2006) concluded that annual income of paddy growers was positive and significantly correlated with their extent of adoption of recommended paddy production technology.

Rathod (2009) in his study indicated that the annual income of paddy growers had positive and highly significant relationship with the extent of adoption of recommended plant protection measures of paddy.

Gaikwad (2010) observed that there was a ‘non-significant’ relationship between the annual income and extent of adoption.

Maheriya (2013) found that annual income of respondents had significant relationship with their technology utilization behaviour.

Karangami (2017) revealed that there was significant association between annual income of rice growers and their adoption level of rice among rice cultivation practicing farmers.

2.3.7 Social participation and Technology utilization behaviour

Pandey *et al*. (2004) found that the association between size of land holding and adoption of recommended rice technology among the farmers of Chhattisgarh was significant.

Parmar (2006) concluded that social participation of the paddy growers had positive and significant correlation with their extent of adoption of recommended paddy production technology.

Thiyagarajan (2011) found that the extent of adoption of SRI by farmers and their social participation were positively and significantly related with each other.

Maheriya (2013) revealed that social participation of respondents was significant relationship with their technology utilization behaviour.

2.3.8 Extension contact and Technology utilization behaviour

Tambat (2007) in his Study on 'Knowledge and Adoption of recommended rice cultivation practices by summer rice growers' found that association between extension contact and adoption was 'significant'.

Gaikwad (2010) found that association between extension contact and adoption was 'significant'.

Karangami (2017) indicated that there was non- significant association between extension contact of rice growers and their adoption level of rice among rice cultivation practicing farmers.

2.3.9 Economic motivation and Technology utilization behaviour

Singh and Baruah (2011) in his study on 'Farmers Adoption Behaviour in Rice Technology: An Analysis of Adoption Behaviour of Farmers in Rice Technology under Different Farming Systems in Assam' observed that economic motivation had significantly correlated with their extent of selected rice cultivation practices.

Thakur (2011) revealed that association between economic motivation and adoption of recommended rice cultivation practices was non-significant.

Maheriya (2013) indicated that extension participation of respondents had significant relationship with their technology utilization behaviour.

2.4 Constraints faced by the paddy growers in adoption of paddy production technology.

Meshram (2009) in his study on 'A study on adoption of rice production technology by the farmers of Waraseoni block of Balaghat district (M.P.)'concluded that the major constraints as reported by the rice growers in adoption of improved rice production technology were high cost of hybrid seed, lack of fund, high cost of implements, lack of training facilities regarding improved rice farming, and lack of relevant demonstration.

Bhosale (2010) observed that major Constraints faced by rural youth were lack of knowledge regarding plant protection measures (90.83 per cent), high cost of chemicals and fertilizers (79.16 per cent), non availability of VLW

for guidance at a time (77.50 per cent), non availability of resistant variety (68.33 per cent), Lack of knowledge regarding dose of fertilizers (66.67 per cent) agro-chemicals are not available as and when required (65.00 per cent), irregular supply of electricity (50.00 per cent) and lack of time due to educational activity (25.00 per cent).

Kumawat (2010) in his study on 'A study on adoption behaviour of farmers in System of Rice Intensification (SRI) practices of paddy cultivation in plain area of Suhagpur block Shahdol District of Madhya Pradesh' concluded that the constraints of the farmers growing paddy. Majority of paddy growers had lack of knowledge about disease control measures (81.67per cent) as a major constraint, followed by lack of knowledge about fungicides (80.83per cent), lack of knowledge about recommended dozes of fungicides and its method of application (78.33 per cent), lack of money to purchase fungicides (63.33 per cent) and fungicides are not available easily (58.33 per cent).

Mahatab (2010) found that the aerobic rice growers expressed constraints related to weed management (81.11 per cent), lower yield (57.78 per cent), difficulty encountered in gap filling in aerobic rice crop (53.33 per cent), difficulty in maintaining plant protection (41.11 per cent), non availability of sowing equipments (32.22 per cent), difficulty in water management (25.56%), poor germination of seeds (20.00 per cent) and micronutrients deficiency problem (13.33 per cent).

More (2011) reported that major constraints were non- availability of seed in time (54.00 per cent) and high cost of seed (34.00 per cent), in ability to identify pest (29.00 per cent), high rate of chemical pesticide (15.00 per cent), in ability of identifying disease (51.00 per cent), and non- availability of dusters and sprayers (6.00 per cent).

Maheriya (2013) indicated that majority of the respondent paddy growers reported that lack of knowledge about recommended dose of fertilizers (70.83 per cent), lack of knowledge about control measures of pests and diseases (62.50 per cent), lack of knowledge about identification of pest and diseases (58.33 per cent), lack of knowledge about recommendation of chemical weed control measures (56.66 per cent), lack of knowledge about recommended hills/m2 (51.66 per cent) and lack of knowledge about recommended spacing (50.00 per cent) were their major technological problems in utilization of (adoption) of recommended paddy production technology respectively.

Wadekar (2013) observed that the major constraints faced by rice growers were ‘unavailability’ of seeds in time’ (81.66 per cent), ‘fertilizers are not available in time’ (91.66 per cent), ‘high cost of pesticides and fungicides’ (75.00 per cent), and ‘high cost of implements (75.00 per cent).

2.5 Suggestions from paddy growers to minimize the constraints in adoption of paddy production technology.

Parmar (2006) observed that major suggestions given by farmers here: farmers should be protected by crop insurance scheme in case of failure of

season followed by remunerative market prices of agriculture production should be provided to the farmers, farm inputs should be provided on subsidized rate to marginal and small farmers, timely supply of canal water, proper technical guidance should be given to the farmers as and when they need, farm inputs should be made available at village level, training on new cultivation technology should be imparted and extension system should streamlined to disseminate farm technology.

Patel (2006) reported the major suggestions as: price of plant protection chemicals should be reasonable, method demonstration should be organized for the effective use of pesticides, and training should be imparted to the farmers regarding the use of pesticides before starting the season technical chemical guidance should be given well in advance before starting of paddy season.

Shivamurthy (2008) in his study on ‘constraints of the farmers cultivating rain fed paddy in eastern dry zone of Karnataka’ reported that extension efforts needs to be made vigorous to increase the adoption level, the knowledge regarding the pesticides, fungicides and weedicides should be enhanced by providing relevant information with their usage and application, suitable marketing facilities should be providing for the rain fed paddy to avoid the exploitation of the middlemen, supply of inputs like certified seeds, recommended seed varieties, fertilizers should be ensured, the cost of inputs for the rain fed paddy should be reduced by providing adequate subsidies and the minimum support prize offered for the rain fed paddy should be timely

introduce and properly paid were the suggestions expressed by the paddy farmers to overcome the constraints faced by them.

Bhosale (2010) reported the rural youth suggestions from as: training on new technologies should be imparted to the rural youth (93.33 per cent), technical guidance should be provided well in advance before start of paddy season (90.00 per cent), regular and timely visit of VLW (61.66 per cent), seeds of resistant variety should be available to the farmers at low level (81.66 per cent), training should be provided regarding use of agro chemical (60.00 per cent), guidance should be provided to raise nursery (58.00 per cent), sufficient electricity power should be available (37.50 per cent).

Jayasankar and Thiyagarajan (2010) in his study on 'Constraints experienced by the rice farmers in adopting recommended biofertilizer practices' reported that State Department of Agriculture may give suitable instruction at gross root level extension workers to deliberately intensify and contact all the farmers during the regular and frequent visits and progress achieved may be review periodically. And also State Department of Agriculture may conduct training programme on bio fertilizer at village level. These were some of the suggestions expressed by the farmers to overcome the constraints in adopting recommended bio fertilizer practices.

Maheriya (2013) indicated that great majority of the farmers suggested that remunerative market prices of paddy should be provided to the (91.67 per cent), farmers should be protected by crop insurance scheme in case of failure of season (87.50 per cent), minimum support price of paddy should be declared

well in advance by the Government (83.33 per cent), extension system should be streamlined to disseminate farm technology (73.33 per cent), proper technical guidance should be given to the farmers as and when they needs (68.33 per cent), training on new cultivation technology should be imparted to the farmer(65.00 per cent), farm information centres should be established at village level (62.50 per cent), Farm consultancy services should be made available to the farmers at village level (58.33 per cent), required farm inputs should be made available at village level (56.66 per cent), timely supply of canal water (54.16 per cent) and electricity should be supplied regularly (50.00 per cent).

CHAPTER III

METHODOLOGY

This chapter deals with research methodology used in the present study. This study was conducted to know the technology utilization behaviour of paddy growers in Sindhudurg district of Maharashtra state. The methodology followed for conducting this investigation is described under the following heads.

3.1 Area of study and its geography

3.2 Research Design

3.3 Sampling procedure

3.4 Variables and their empirical measurement

3.5 Operationalization and measurement of variables

3.6 Statistical analysis

3.1 Area of study and its geography

The study was conducted in Sindhudurg district of the Konkan region of Maharashtra state. Paddy is one of the important cereal crop grown more or less in the all the taluka of Sindhudurg district. Communication is mainly facilitated by roads and to some extent by railway.

3.1.1 Topography

The topography of Sindhudurg district is hilly and many villages are situated in remote, interior zones and in foothills of sahyadari. This district is located on the western coast of India and lies between 15^0 37' to 16^0 40' north latitude and 73^0 19' to 74^0 13' east longitude. The district has an average east-west spread of about 60 km.

3.1.2 Boundaries

The Sindhudurg district in the south and Sahyadri hills in the east. The Sindhudurg district is flanked by Arabian Sea in the west and Sahyadri hills in the east. The district is bounded by Ratnagiri district in the north and the states of Goa and Karnataka are situated on the south side.

3.1.3 Soils

The soils of Sindhudurg district is lateritic with brownish red colour and are termed as rice soils and *warkas* soil. The pH of the soil ranges from 5.5 to 6.5, which indicate its acidic nature.

3.1.4 Climate

The climate of this district is generally warm and humid. Monsoon rains are usually received during the month of June to September. The average annual precipitation is about 3000 mm to 3500 mm. The intensity of rain is high in the month of July. The temperature of the districts varies from 17^0 C to 36^0 C.

3.1.5 Crops

Rice (*Oryza sativa* L.) is the major staple food of the districts, followed by Nagli (*Eleusine coracana*) and Wari (*Panicum miliaceum*). These crops are mainly grown in *Kharif* season. After the harvest of *kharif* rice, the pulse crops namely Wal (*Dolichus lablab*), Cowpea (*Vigna sinensis*) and Mung (*Vigna radiata*) are grown on residual moisture.

Among the horticultural crops, Mango (*Mangifera indica*), Cashew nut (*Anacardium occidentale L.*), Coconut (*Cocus nucifera*) and Areca nut (*Areca catechu*) are the major fruit crops.

3.2 Research design

A research design is the arrangement of conditions for the collection and analysis of data in a manner that combines relevance to the research purpose with economy in procedure. In fact, the research design is the conceptual structure within which research is conducted. It constitutes the blue print for the collection, measurement and analysis of data. 'Ex-post facto' research design is worthy to apply when the independent variables have already acted upon. Hence, this design was used in the present study.

3.3 Sampling procedure

Sampling is a method of selecting a fraction of the population in such a way that the selected sample represents the population. For selection of sample, four stage sampling method namely, selection of districts, selection of tahsil, selection of villages and selection of respondents was followed.

3.3.1. Selection of district:

The study was conducted in Sindhudurg district of the Konkan region of Maharashtra state. The rice productivity is higher in Sindhudurg district as compared to other districts of Konkan region. Paddy is one of the important cereal crop grown more or less in the all the tahsils of Sindhudurg district. Looking to this fact, the Sindhudurg district was purposively selected for the present study.

3.3.2 Selection of tahsils

Four tahsils from Sindhudurg district with maximum area under rice cultivation were selected for the study. Thus Kudal, Kankavali, Malavan and Sawantwadi tahsils were selected for the study. The selected tahsils along with their area under rice cultivation are given in Table 1.

Table1: Tahsil wise area under rice cultivation in Sindhudurg district

Sl. No.	**Tahsils**	**Area under rice cultivation(ha.)**
1.	**Kudal**	**12355**
2.	**Kankavali**	**11440**
3.	**Malavan**	**9318**
4.	**Sawantwadi**	**6450**
5.	Devgad	4560

6.	Vengurla	3740
7.	Vaibhavwadi	3670
8.	Dondamarg	1908

(Source- District Agricultural Office, Sindhudurg)

3.3.3 Selection of villages

From the selected four tahsils of Sindhudurg district a list of rice growing village were obtained from TAO. On the basis of maximum area under rice cultivation five rice growing villages were selected on random basis and thus, the total twenty villages were selected. List of villages is given in Appendix-I.

3.3.4 Selection of respondents

The six rice farmers from each village were selected randomly. Thus, the total sample for the research study was 120 rice farmers. List of selected respondents is given in Appendix-II.

3.4 Variables and their empirical measurement

The selection of variables included in the study were done on the basis of extensive review of literature related to the subject in consultation with the experts and from previous study conducted in the related subject. Finally, the variables that were found to be most relevant to the present study were selected for the study. A list of selected dependent and independent variables is as under.

3.4.1 Dependent variable under the study

Sl.No.	Variable	Empirical measurement
1.	Technology utilization behaviour	Package of practices for rice crop recommended by DBSKKV, Dapoli.

3.4.2 Independent variables under the study

Sl. No.	Variables	Measurement technique
1.	Age	Chronological age of the respondents at the time of interview.
2.	Education	Formal education successfully completed by the respondent was taken into consideration.
3.	Farming experience	The number of years actually spent by the respondent in farming.
4.	Social participation	The degree of involvement of the respondent in formal and informal organization, simply as a member or an office bearer. Procedure followed by Nirban (2004)

5.	Land holding	Total land possesses by the respondent at the time of interview.
6.	Area under rice crop	The actual area of land in hectares put under rice cultivation.
7.	Annual income	Total income received by the respondent and his/her family members from all the sources.
8.	Extension contact	The frequency of contacts of the respondent with extension personnel of development departments during one year, with a view to seek guidance on the issues related to agriculture in general. Procedure followed by Nirban (2004)
9.	Economic motivation	The degree to which a farmer is oriented to use of scientific methods in decision making and farming. Procedure followed by Supe (2007)

3.5 OPERATIONALIZATION AND MEASUREMENT OF VARIABLES

The Measurement of techniques for each of the selected independent as well as dependent variables is presented below.

3.5.1 Operationalization and measurement of independent variable.

3.5.1.1 Age

The chronological age of the respondent at the time of interview was taken into consideration. The following categories of age were made by using formula mean (51.58) ± SD (10.95).

Sl.No.	Category	Age (years)
1.	Young	Up to 41years
2.	Middle	42 to 62 years
3.	Old	63 years and above

3.5.1.2 Education

It is assumed that the formal education increases the potentiality to techniques an individual. With this view, the information regarding formal education successfully completed by the paddy growers was taken into consideration. The following categories were made on the basis of formal educational level attained by the respondents.

Sl.No.	Category	Education (Std.)
1.	Illiterate	No education
2.	Pre primary	Upto 4^{th}
3.	Primary	5^{th} to 7^{th}
4.	Secondary	8^{th} to 10^{th}
5.	Higher secondary	11^{th} to 12^{th}
6.	College	13^{th} and above

3.5.1.3 Farming experience

It refers to the number of years actually spent by the respondent in farming. The following categories of experience in rice cultivation were made by using the formula mean (31.25) ± standard deviation (12.20).

Sl. No.	Category	Farming Experience
1.	Low	Up to 19 years
2.	Medium	20 to 42 years
3.	High	43 years and above

3.5.1.4 Land holding

It refers to total number of hectares of land possessed by an individual respondent for cultivation. Numbers of hectares of land possessed were considered as individual respondent and it were categorized into following categories. (A per norms of Government of Maharashtra).

Sr. No.	Category	Land holding (ha.)
1	Marginal	Up to 1.00
2	Small	1.01 to 2.00
3	Semi medium	2.01 to 4.00

(Standard of area of categorization given by Govt. of Maharashtra)

3.5.1.5 Area under rice crop

It refers to the actual area brought under rice cultivation by respondents. Accordingly, the respondents were grouped into following three categories considering mean (0.52) $\pm$ standard deviation (0.34).

Sl. No.	Category	Area under rice cultivation (ha)
1.	Low	Up to 0.18 ha.
2.	Medium	0.19 to 0.85 ha.
3.	High	0.86 ha. and above

3.5.1.6 Annual income

It refers to total income received by the respondent and his/her family members from all the sources. The following categories of annual income were made by the using formula Mean (85958.33) ± SD (59204.45).

Sl. No.	Category	Annual income
1.	Low	Up to Rs. 26754/-
2.	Medium	Rs. 26755/- to Rs.145163/-
3.	High	Rs. 145164/-

3.5.1.7 Social Participation

Social participation refers to the degree of involvement of the respondent in formal and/or informal organization, simply as a member or an officer bearer. The Social participation of respondents was measured with the help of scale developed by Nirban (2004). The social participation score of the respondent was calculated on the basis of the nature of participation and the number of organizations he/she participates. A score of one was assigned to an individual when he/she was a member of organization; a score of two was given to the respondent who was the office bearer of an organization. Further, a score of two was given for "regular' participation, while one and zero score was given for 'occasional' and 'never/no' participation, respectively. Thus, the cumulative score was obtained for each respondent and finally, they were grouped into three categories considering the mean (1.64) ± standard deviation (1.35).

Sl. No.	**Category**	**Social participation (score)**
1.	Low	Up to 0.30
2.	Medium	0.31 to 02.98
3.	High	2.99 and above

3.5.1.8 Extension contact

It is operationalized as the frequency of contacts of the respondent with extension personnel of developments department during one year, with a view to seek guidance on the issues related to agriculture in general. The Extension contact of respondents was measured with the help of scale developed by Nirban (2004). Quantification of the variable is done by assessing the score to the frequency of contact with each score, like once a week (6 score), once in a fortnight (5 score), once in a month (4 score), once in a three month (3 score), once in a six month (2 score), once in a year (1 score) and no contact (0 score). After calculating the cumulative score, the respondents were categories in to three groups by using formula mean (10.82) ± SD (1.93).

Sl. No.	**Category**	**Extension contact (score)**
1.	Low	Up to 8.89
2.	Medium	8.90 to 12.73
3.	High	12.74 and above

3.5.1.9 Economic motivation

Economic motivation is defined as occupational success in term of profit maximization and relative value of an individual places on economic ends. The degree of an economic motivation of the respondents was measured with the scale developed by Supe (2007). This scale consisted six items. Of these six statements first five statements are positive and statement number six is negative. The response of the respondents was obtained against each

statement in term of their agreement or disagreements on a five point continuum ranging from strongly agree, agree, undecided, disagree, and strongly disagree. The positive statements were scored 5,4,3,2 and 1 for strongly agree, agree, undecided, disagree, and strongly disagree, whereas, the scoring system was reversed in case of negative statements. After calculating the cumulative score, the respondents were categories in to three groups by using formula mean (23.53) ± SD (2.29).

Sl. No.	Category	Economic motivation
1.	Low	Up to 21.23
2.	Medium	21.24 to 25.81
3.	High	25.82 and above

3.5.2. Assessment of knowledge in paddy cultivation.

Knowledge level was operationalized as the level to which the respondents had correctly answered the questions about the different aspects related to recommended rice cultivation practices. In order to judge the knowledge level of the respondent, 87 practices recommended by DBSKKV, Dapoli were selected with the help of experts and the extension specialist. A score of one was given for the correct answer. On the basis of total knowledge score obtained by the respondents, they were classified in to three categories considering the mean (47.91) ± Standard Deviation (10.09).

Sl.No	Category	Score
1.	Low	Up to 38
2.	Medium	39 to 58
3.	High	59 and above

3.5.3 Operationalization and measurement of dependent variable.

3.5.3.1 Technology utilization behaviour (Adoption behaviour) of respondent in paddy production technology.

For measuring the extent of adoption, 87 practices recommended by the Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli for cultivation of rice crop were selected. The adoption score was worked out by assigning the score of '2', '1', '0' for 'full', 'partial' 'and 'no' adoption' of each recommended practices for rice cultivation. By using the formula of mean (58.66) $\pm$ (09.54) standard deviation they were grouped into three categories as shown below:

Sl. No.	Category	Package of practices adopted by paddy growers (Score)
1.	Low	Up to 49
2.	Medium	50 to 67
3.	High	68 and above

3.6 Tools and techniques of data collection

Data were collected by the investigator himself with the help of a structured interview schedule developed for the study.

3.6.1 Construction of interview schedule

The interview schedule was prepared, so as to help in collection of information in line with the objectives of the study. While preparing the schedule, attention was given to make the questions simple, self-explanatory with clarity, so that the respondents could understand the same and give the response more accurately.

3.6.2 Pre-testing of interview schedule

The interview schedule was pretested by interviewing 10 farmers in non-sample area. This was considered necessary, so that the interview schedule would hold well while interviewing the sample. Necessary modifications were carried out in the schedule after pretesting. The final format of the schedule used for collection of information is placed as Appendix- III

3.6.3 Collection of data

Personal interview technique was used for data collection. Before starting an interview, the investigator introduced him and explained the purpose of his visit to each respondent. During the course of interview, the questions were asked serially to the respondent. Whenever necessary, questions were explained to them to ensure proper understanding. This helped in securing appropriate response from the respondents. The filled-in interview schedule

was checked immediately after the closure of the interview for its completion in all respects.

3.7 Statistical analysis

The data were processed and tabulated by using simple frequencies and the parameters like percentage, mean, standard deviation and Chi-square test were used according to requirement.

3.7.1 Percentage

Percentage was used in descriptive analysis of data for making simple comparison.

3.7.2 Mean

Mean was calculated by using the following formula.

$$\overline{X} = \frac{\sum Xi}{n}$$

Where,

$\overline{X}$ = Mean,

n = number of observations

Xi = value i^{th} of observation

3.7.3 Standard deviation

It is defined as the square root of the mean of the squares of the deviations taken from arithmetic mean.

$$SD = \sqrt{\frac{\sum (Xi - \bar{X})^2}{n - 1}}$$

Where,

S.D. = standard deviation

Xi = Individual score

$\bar{X}$ = Mean of the sample

n = Total number of respondents

3.7.4 Chi-square test

To find out the association between independent and dependent variables, chi-square test was used. The formula is given below.

$$X^2 = \sum \frac{(O - E)^2}{E}$$

Where,

X^2 = Chi-square
Σ = Summation of
O = Observed frequency
E = Expected frequency

CHAPTER V

SUMMARY

The present research project entitled ‘Technology utilization behaviour of paddy growers in Sindhudurg district of Maharashtra state’ was undertaken with the following specific objectives.

Objectives

5.1 The profile of paddy growers.

5.2.1.1 Overall Knowledge of paddy growers about paddy production technology.

5.2.1.2 Practice wise knowledge of paddy growers about paddy production technology.

5.2.2.1 Overall technology utilization behaviour of paddy growers about paddy production technology.

5.2.2.2 Practice wise technology utilization behaviour of paddy growers about paddy production technology.

5.3 Association between profile and technology utilization behaviour of paddy growers.

5.4 Constraints faced by the paddy growers in adoption of paddy production technology.

5.5 The suggestions from paddy growers to minimize the constraints in adoption of paddy production technology.

The study was conducted in Sindhudurg district of Maharashtra state. In all, twenty villages from four tahsils namely Kudal, Kanakavali, Sawantwadi and Malavan were selected based on maximum area under paddy cultivation. An interview schedule was specially designed, in line with the objectives set forth, to collect the needed information. The data were collected by personally interviewing 120 randomly selected paddy glowering farmers from these 20 villages. The findings of the study are summarized below.

5.1. Profile of paddy growers

It is revealed that slightly iess than two third (65.00 percent) of the respondents belonged to ‘middle’ age category with average age of 51.58 years. It could be observed that maximum number (35.83 per cent) of the respondents had ‘secondary’ education with average educational level of 8.18 std. It is revealed that 65.83 per cent of the respondents were having ‘medium’ farming experience with average farming experience was 31.25 years. It could be indicated that 82.50 per cent of the respondents had ‘marginal’ land holding. With regards to area under rice cultivation, it was observed that 88.33 per cent of the respondents had ‘medium’ area under rice cultivation with average area under rice cultivation was 0.52 ha. It was observed from that majority (79.17 per cent) of the respondents had ‘medium’ annual income with average annual income was Rs. 85958/-

It is revealed that 61.66 per cent of respondents were having ‘medium’ social participation with average social participation score was 1.64. It is seen that majority (90.83 per cent) of the respondents had ‘medium’ extension

contact with average extension contact score was 10.82. It is observed that majority (67.50 per cent) of the respondents had ‘medium’ economic motivation with the average economic motivation score was 23.53.

5.2.1 Knowledge of paddy growers about paddy production technology

5.2.1.1 Overall Knowledge of paddy growers about paddy production technology.

It is revealed that nearly two third (65.83 per cent) of the respondents had ‘medium’ knowledge of the paddy production technology with the average knowledge score about rice technology was 47.91.

5.2.1.2 Practice wise knowledge of paddy growers about paddy production technology.

The data regarding practice-wise knowledge of paddy production technology revealed that, all cent percent of the respondents had knowledge about ‘use high yielding variety’. The majority (98.33 per cent) of the respondents had knowing about ‘use quality of seed’. The majority (83.33 per cent) of the respondents were knowing about ‘add 1 kg urea + 3 kg single super phosphate per guntha area of the raised bed’. All (100.00 per cent) the respondents were knowing about ‘transplant of seedling within 20-25 days depending on duration of variety’. The majority (93.33 per cent) of the respondents were aware about recommended dose of 40 kg N, 50 kg P and 50 K/ha as a basal dose during transplanting while char-sutri was known to 35.00 per cent of the respondents. The all the respondents were knowing about

‘maintain water level of 2-5 cm for period of one month after transplanting’ and maintain water level of 5 cm. up to grain filling stage and Drain out water 8 to 10 days before prior to harvesting. All (100.00 per cent) the respondents were knowing about ‘as per the need follow hand weeding on the field’.

All (100.00 per cent) the respondents were knowing about ‘collect and destruct stubbles in field for control stem borer. The 74.17 per cent respondents knowing ‘maintain frog population in field’ for control army worm, while 38.33 per cent of the respondents had knowledge about ‘collect and destroy nymphs and adults’ for control of leaf roller. All (100.00 percent) the respondents were knowing about ‘keep the field weed free’ for control of gundi bug. All (100.00 per cent) the respondents were knowledge about ‘removal stubbles and burn’ for control of blast, all (100.00 per cent) the respondents were knowledge about ‘removal and destruction of stubbles’ and ‘keep the bunds clean’ for control of bacterial blight. Only 16.67 per cent of the respondents were aware about ‘as a preventive measure spraying 3gm zineb (Dithane Z-78) per liter of water’ for control false smut of paddy.

It observed that, all (100.00 per cent) the respondents were knowing **‘**harvest the crop at 90%grain maturation and plants are still green’ and ‘dry under sun for 2 days after harvest in the field’. All the respondents were knowing about ‘beating against stone for threshing of rice’ and winnowing with the help of ‘hand and machine’. All the respondents were aware about ‘before storage, dry grains for 3-4 days under sun’.

5.2.2 Technology utilization behaviour of paddy growers

5.2.2.1 Overall technology utilization behaviour of paddy growers about paddy production technology.

It is revealed that more than one third (70.00 per cent) cent of the respondents had ‘medium’ technology utilization behaviour of the selected agricultural technologies of paddy crop. The average adoption score was 58.66 indicating medium technology utilization behaviour.

5.2.2.2 Practice wise technology utilization behaviour of paddy growers about paddy production technology.

The data regarding practice-wise technology utilization behaviour revealed that, majority (81.67 per cent) of the respondents had ‘full’ technology utilization behaviour of ‘use high yielding variety’. The all (100.00 per cent) the respondents had ‘full’ technology utilization behaviour of ‘one ploughing before or after first rain’. The 81.67 per cent of the respondent had ‘full’ technology utilization behaviour of ‘use quality seed’ and 95.83 per cent of the respondents had ‘no’ technology utilization behavior of ‘prepare raised beds for sowing of seed’. The 100.00 per cent respondents had ‘no’ technology utilization behavior of ‘spray Oxadiargyl (6 E.C.) herbicide @ 3 ml per liter of water for 0.01 ha. for control weed’. The 75.00 per cent of the respondents had ‘full’ technology utilization behavior of ‘transplant seedling within 20-25 days depending on duration of variety’ and majority (66.67 per cent) of the

respondents had ‘full’ technology utilization behavior of the practice namely ‘use of wooden plough’. The 100.00 per cent of the respondents had ‘partial’ technology utilization behavior of the practice namely ‘maintain recommended plant population during transplanting’.

Majority (77.50 per cent) respondents had ‘partial’ technology utilization behavior with the practice namely ‘apply 40 kg N, 50 kg P and 50 kg K/ha as a basal dose during transplanting’. In Char – Sutri of rice cultivation, practices were not adopted by the respondents in study area only 10.83 per cent respondents ‘partial’ adoption of practice namely ‘add 10 t/ha of Glyricidia leaves during puddling to avoid application of nitrogenous fertilizer (60 DAT). Majority (75.00 per cent) of the respondents had ‘full’ technology utilization behavior of the practices namely ‘maintain water level of 2-5 cm for period of one month after transplanting’, ‘maintain water level of 5 cm. upto grain filling stage’ and ‘drain out water 8 to 10 days before prior to harvesting’, while ‘no’ technology utilization behaviour was observed in ‘use of Japanese hoe 30-35 days after transplanting to control weed population’ and ‘use of cono weeder 30-35 days after transplanting to control weed population’ and ‘so also weedicide application.

The cent percent of the respondents had ‘full’ technology utilization behavior of the practice namely ‘deep ploughing after harvest of previous crop’, while all the respondents had ‘partial’ technology utilization behavior of the practice namely ‘collection of plant residues immediately after harvesting’, whereas 75.00 per cent of the respondents had ‘full’ technology utilization

behavior of the practice namely ‘transplanting of seedling at proper age reduces the incidence of pest’. All the respondents had ‘full’ followed the practice namely ‘collect and destruct stubbles in field’, while Large majority of the respondents had ‘no’ technology utilization behavior in case of practices namely ‘apply Carbofuran (3 %) 20 kg/ha’, ‘apply Phorate (10%) 10 kg/ha’ and ‘apply Quinolphos (5 %) 15kg/ha. for the control of stem borer. Majority (64.17 per cent) of the respondents had ‘no’ technology utilization behaviour with the practice namely ‘collect and destroy egg masses and larvae’ while all of them did not follow the practices namely ‘dust 2 % Methyl Parathion powder @ 20 kg /ha.’ for control of army worm. All (100.00 per cent) of the respondents had ‘no’ technology utilization behaviour of the practice namely ‘spray Fenitrothion 50 E.C, 500 ml per 500 liter water per ha.’ for control of leaf roller. The 94.17 per cent of the respondents had ‘no’ technology utilization behaviour of the practice namely ‘apply Malathion 50 EC 2 ml. per lit. water’ for control of gundi bug. All (100.00 per cent) the respondents had ‘no’ technology utilization behavior of the practice namely ‘use of 5% Lambdacychalothrin 250 ml. per 500 liters of water per ha.’ for control of blue beetle. All (100.00 per cent) the respondents had ‘no’ technology utilization behavior of the practices namely ‘poison baits for control of crabs’, ‘prepare poisons bait by the mix of 1 kg. cooked rice 75 gm. 75% water soluble acephate powder mix in water’ and ‘mixing 100 ml 50% methyl parathion in 1 kg cooked rice’ for control of crabs. All (100.00 per cent) of the respondents had ‘no’ technology utilization behavior of the practices namely ‘spraying of

1ml Edifenphos per liter of water' or '1gm Carbendazim per liter of water' for control of blast. Majority (100.00 per cent) of the respondents had 'full' technology utilization behavior of the practice namely 'removal and destruction of stubbles', whereas 89.17 per cent of the respondents had 'no' technology utilization behavior of the practice namely 'use copper oxycloride 25 gm + 1 gm strepthocycline mixing with 10 litres of water' for control of bacterial blight. For control of false smut large majority of the respondents had not followed spraying of 2.5gm Mancozeb (Dithane M-45) per liter of water' and 'no' spraying of 3gm Zineb (Dithane Z-78) per liter of water' as a promotive measure.

It is observed that, all (100.00 per cent) the respondents had 'full' technology utilization behaviour of the practice namely 'harvest the crop at 90 per cent grain maturation and plants are still green', while all (100.00 per cent) of the respondents had 'full' technology utilization behavior of the practice namely 'dry under sun for 2 days after harvest in the field'. Majority (84.17 per cent) of the respondents had 'no' technology utilization behavior of the practice namely 'threshing through mechanical thresher' while 75.83 per cent of the respondents had 'full' technology utilization behavior of the practice namely 'threshing through beating against stone'. The 76.67 per cent of the respondents had 'full' technology utilization behavior of the practice namely 'winnowing by hand'. All the respondents had 'full' technology utilization behavior of the practice namely 'before storage, dry grains for 3-4 days under sun'.

5.3 Association between profile of the farmers and technology utilization behaviour of paddy growers

The association between profile of paddy growers and their technology utilization behavior namely, area under rice cultivation, rice yield, experience of rice cultivation, age, farming experience, land holding, area under rice crop, social participation, extension contact and economic motivation was non-significant. However, the association of education, annual income with technology utilization behavior of paddy growers was significant.

5.4 Constraints faced by the paddy growers in adoption of paddy production technology.

Major constraints faced by respondents in paddy cultivation were high cost of inputs (90.93 per cent), lack of knowledge about recommended plant protection practices (88.33 per cent), lower market price to produce (80.00 per cent), non-availability of university recommended varieties in local area (76.67 per cent).

5.5 Suggestions from paddy growers to minimize the constraints in adoption of paddy production technology.

To minimize the constraints in technology utilization (adoption) of recommended paddy production technology majority of the respondents suggested that, need to increase the minimum support prize of paddy (89.67), seeds of resistant variety should be available to the farmers at tahasil level (77.50), cost of inputs for the rainfed paddy should be reduced (72.50), university may conduct training programme on recommended package of practice (63.33).

CHAPTER VI

IMPLICATIONS

The farmer living in rural areas directly or indirectly depend upon agriculture as a source of livelihood. The paddy growers in the Konkan region own marginal and small land holdings and grow paddy crop which is not much remunerative. As a result, their economic status is found to be lower. Under such circumstances, it is evident that their living standard can be elevated by developing their agriculture in general and way of cultivation of paddy in particular. Some efforts have been made in the past to know the socio-economic conditions of paddy growers. However, the paddy cultivation practices followed by the farmers in the context of recommended technology have not been investigated so far. The present research project, "Technology utilization behaviour of paddy growers in Sindhudurg district of Maharashtra state" was designed and conducted to collect data on this vital aspect. The implications brought forward by the present study are listed below.

1. Profile analysis indicates that the paddy growers had middle age group, moderately educated, medium level of farming experience, medium area under rice cultivation, medium annual income, medium social participation, extension contact and economic motivation respectively. The extension workers may consider these facts while planning and executing the programmes for agricultural development of the farmers.
2. Land holding of the paddy growers has been observed 'marginal', it is one of the important reason for moderate level of technology utilization

behaviour. Hence, extension personals need to encourage paddy growers to adopt ‘cluster approach’ which will be beneficial to improve technology utilization in paddy production technology.

3. The overall Knowledge level of the paddy growers was found medium level. This is not an appreciable fact. Necessary extension strategies are to be formed to bridge the knowledge gap.

4. It was observed that the technology utilization behaviour of paddy growers was at medium level. The study has clearly indicated the practices which were fully and partial technology utilization behaviour as well as no technology utilization behaviour of paddy growers. These observations may serve as feedback for future line of action. Demonstration and training on paddy technology need to be taken massively by concerned extension and development agencies in these areas for the practices which were least or no technology utilization.

5. Effort should be made to concentrate in area of plant protection, fertilizer and weed management while planning of training programme.

6. The study has categorically pointed out that high cost of inputs were the most severe constraints experienced by the paddy growers in technology utilization of those practices which were of situational in nature. Thus, effort should be made the research institutes, SAUs, government, private sector to concentrate on reduce the cost of inputs through research.

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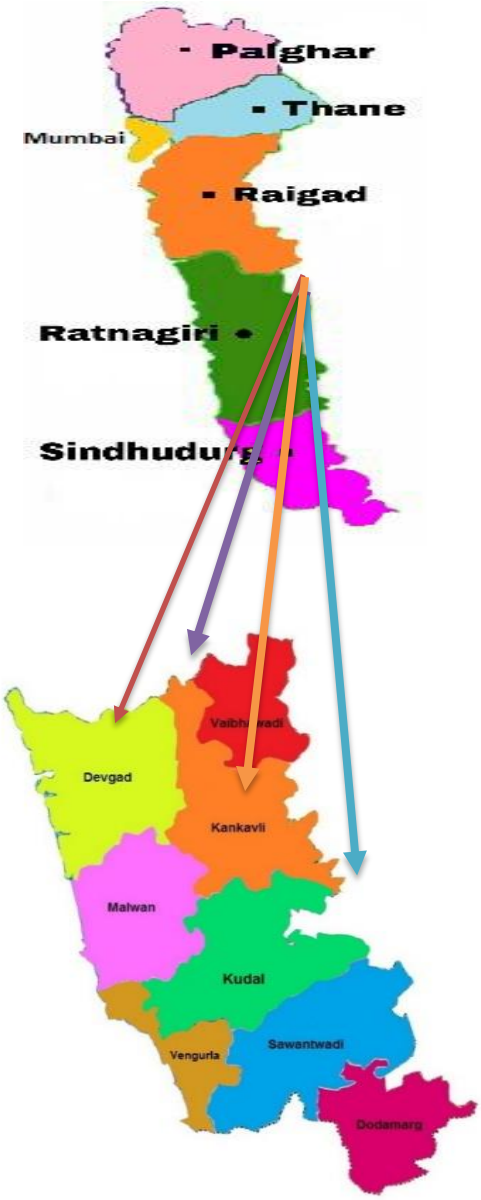
Fig. 1. Map showing the study area



Selected talukas from Sindhudurg District

Area of the study-

(Note : Map not to the scale)