

Identification of Paddy Yield Using Eco-Friendly Technology

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ABSTRACT : Investigations were carried out during kharif season of 2007, at B.vaddahalli Village to evaluate the eco-friendly organic and conventional farming and their economics in a paddy based cropping system. The experiment was laid out in command area with one replication. The conventional farming treatment received full dose of recommended NPK weed control through herbicide and plant protection by chemicals such as DAP, Urea, Ammonium Sulphate. In SIP method weed control through manual weeding and plant protection by Neem products. The plant protection was done through Neem oil 3% and NSKE 5% were used for the plant protection. Seed treatment by using *Azospirillum* inoculated. *Trichogramma Japonicum* was used as biological control of stem borer and leaf folder respectively. Application of FYM + Neem cake, tank silt + panchagavya markedly improved yield and it was better than conventional method. Neem oil 3% and NSKE % and release of *Trichogramma Japonicum* effectively controlled stem borers, leaf folder. Conventional farming recorded higher net returns Rs. 3295 per Half acre for Kharif season 2007. The next best was FYM + Neem cake + tank silt + panchagavya application Rs 11380 per half acre in kharif season 2007.

KEY WORDS: *Azospirillum* , FYM ,NSKE, panchagavya, SIP

I. INTRODUCTION

India's population with a growth rate of over two percent annum will reach one billion mark by the end of this decade and is likely to reach 1.6 billion towards the end of next century. Therefore our efforts need to be concentrated for not only increasing the total food production but also to meet the needs for food, fiber and fuel wood by going for sustainable production systems. The past efforts for increasing the productivity were, however, confined to area expansion in irrigated areas. Indiscriminate use of high fertilizers has caused several problems on farm as well as outside farm. Plants became more susceptible to pests and diseases and their control could be effectively done by using high potency poisonous chemicals. As a result of their residue on plants and in the soil lead to health hazard. Similarly, excess nitrogen as nitrate sources of drinking water also responsible for health hazards.

The potential detrimental effects of fertilizers in plants are reduced in germination, retardation in seedling growth, scorching and increased susceptibility to diseases. Mathemoglobinemia (Blue baby disease) in infants cancer, respiratory illness in human beings, eutrophication and plant toxicity due to excess availability of inorganic and organic Nitrogen in surface water and soil. With the cattle wealth declining in India, sources of organic manures have reduced over the years. There has been declining trend in the overall response to inputs with continuous depletion of soils in intensively cultivated area, deficiency of secondary nutrients and micro nutrients like, Zn, Mn, Bo and Fe are becoming more conspicuous. To have soil health in order and minimize residue toxicity etc. there is need to take eco-friendly farming is not mere non chemical agriculture but it is a system integrating relationships between soil, plant, water, soil, micro-flora and fauna. Eco-friendly technology organic farming aims in creating a healthy soil, helps in proper energy flows in soil crop water environment plant systems.

Keeps biological life cycle alive and helps in sustaining considerable levels in yield. Uses of high yielding varieties and modern paddy production technologies through resulted in increased paddy production, eco-friendly farming in one of the solution in long run to safe guard soil health, crop production system and inter relationship and ecology of paddy farming systems. This also helps in further pegging down underground water pollution increasing levels of residue of food which would be economical and highly beneficial over a period of time. Use of eco-friendly manures in one form or the other through inherent in Indian farming has advantages like nutrient conservation. Slow release improvement of soil physical conditions resulting in higher crop yields for efficient nutrient Management in a cropping system basis, the use of available organic resources such as FYM, compost, Biogas, Slurry, Green manures, legumes tank silt sewage sludge, urban waste, farm waste and crop residues should necessarily be dovetailed for increasing soil productivity. Keeping in view of the nutrient needs of the crop, use of bio-fertilizers, Bio-pesticides and microorganism is also could be adopted. with chemical fertilization, the soil systems degraded. There fore augmenting soil resources in paddy – paddy cropping system is a must.

This had to be done with those forms of nutrients in such a way the crop fully utilize the energy and water. The full utilization depends also on the genetic potential of the variety and this combined efficient management practices encourage more efficient sustain food production of land would further reduce exploitation of fragile soil crop production system particularly in irrigated areas. The farmers who are pursuing organic farming are called organic farmers and have proven to the world that, their farming system is distinguished from other agricultural systems and above all a competitive and able to provide agricultural products of good quality while minimizing negative side effects. There is no adequate and proper documentation of the efforts made by such farmers. As a result not much literature is available to other farmers about practices. Farmers lack readymade packages to jump into such alternative farming methods, their fear and doubts about such efforts are kept unanswered. Keeping in view, the above and the known possible regions of low productivity of paddy in order to develop a proper sustainable paddy – paddy production system management with eco-friendly techniques at economically profitable levels, an attempt has been made in the present study with the following objectives.

- [1] To evaluate the paddy-paddy cropping system and eco-friendly practices in comparison with conventional practice.
- [2] To study the effect of eco-friendly manures growth and yield of paddy-paddy cropping system under eco-farming practices.
- [3] To work out the economics of growing paddy under eco-farming practices.
- [4] To identify the benefits of eco-friendly farming as perceived by the respondents.
- [5] To evaluate the paddy – paddy cropping system under eco-friendly practices in comparison with the conventional practice.
- [6] To study the effect of eco-friendly manures on growth and yield of paddy in the paddy- paddy cropping system under eco-farming practices.
- [7] To study impact of eco farming practices on soil fertility.
- [8] To work out the economics of growing paddy under eco-farming practices.

II. MATERIALS AND METHODS

2.1 STUDY AREA

Field experiments were conducted during Kharif season of 2007 at B.vaddahalli village 28 Km Away from district head quarters of Kolar 6 Km away from the Chintamani taluk. Details of the experiments materials used and the procedure followed are presented in this chapter.

2.2 WEATHER AND CLIMATE

The climate of the district is seasonally dry tropical savanna climate with four seasons. The dry season with clear bright weather is from December to February. The summer season from March to May is followed by the south west monsoon from June to September October and November constitute the post monsoon or retreating monsoon. The mean dry temperature is about 35 in summer and 14 in winter. The maximum percentage of rainfall between July to October and mean annual rain fall is around 705 mm.

2.3 FIELD AND SOIL

The experiments were conducted in command area during kharif season of 2007. The soil of the experimental field was red sandy loam with pH 7.2 N 0.78 P 0.4 K 46.3 EC 0.169 Oc 0.41 and totally moderate climate. The experimental field was irrigated with good quality water from a tank situated nearby.

2.4 SEASON CROPS AND VARIETIES

The field experiment was conducted i.e. during kharif season of 2007 using KRH-2 variety of paddy maturing in 130 days with a yield potential of 35 quintal/acre with 130 days of duration.

2.5 TREATMENTS

FYM (5tons) +NPK (10:10:10)+NSKE(3LITERS)+FeSO₄ Znso₄(4+4kgs)+ tank silt(4tons)

TABLE NO-1 plot size, date of sowing and harvest

Particulars	Kharif-2007
Variety	Krh-2
Date of sowing	July 15
Date of harvest	November 30
Gross plot size	20 Gunta

2.6 SEMI IRRIGATED PADDY

It means irrigated once in 5 days and maintained spacing about 1ft x 1ft

2.7 LAND PREPARATION

The land was drying ploughed with tractor drawn disc narrow and was puddle with country plough with country plough and with tractor drawn cage wheel. The field was leveled with bullock drawn wooden leveling plank in kharif 2007. The layout was taken providing with buffer channels all round the plot to minimize the movement of nutrients final leveling was done with hand leveling board to ensure uniform flow of water.

2.8 SEEDS AND SOWING

The seeds were obtained from agriculture department Chikkaballapur. Seed rates of 2Kg/Acre of KRH – 2 varieties were used. The seeds were soaked in water for 24 hrs. And incubated 12 hrs by gunny bag Azospirillum was inoculated to seeds before seed dibbling

2.9 CULTIVATION METHOD

- a) Direct seed sowing of paddy were followed
- b) Maintained spacing from plant to plant and row to row about 1ft X 1ft

2.10 WATER MANAGEMENT

Instead of sub merged irrigation the field was irrigated once in 5 days. The irrigation was stopped 15 days before harvest

2.1.1 FERTILIZATION

During active till ring and panicle initiation stages i.e. 6th week 10th week applied 5:5:5 NPK per ½ acre.

2.1.2 PLANT PROTECTION

Used Bio control agents Trichogramma Japonicum on 30 and 35 days after direct seed sowing 10 cards were stapled at 20 spots in ½ acre 5 to 6 times at weekly interval were released to control stem borer and leaf borer neem oil 3% and NSKE 5% were sprayed as prophylactic measures against insects.

2.1.3 WEED CONTROL

Weeding in paddy by using manual weeder once in a week.

2.1.4 RODENT CONTROL

- a) Sand was broad coated to trace the movement of rodents.
- b) Stapled erected poles in the field to provide space for the birds to rest which helps in biological control of pests.

2.1.5 HARVESTING AND THRESHING

When the crop was fully matured, two rows all around the experimental plot were harvested as border rows and the net area was harvested separately. Threshed individually and weight of the grain and straw were recorded. The straw was sun-dried and yield was recorded.

2.1.6 BIOMETRIC OBSERVATIONS

Biometric observations were recorded as per the guidelines By All India Coordinated Rice Improvement Project (Ten have, 1977). In each plot, five Plants were selected and random and labeled for recording observations.

2.1.7 GROWTH CHARACTERS

- a) Plant height
Plant height was measured from the base of the plant to the tip of the longest leaf and up to the tip of the leaf at 45 days after seed sowing and at harvest.
- b) Number of tillers
Total number of tillers was counted at 45 days after direct seed sowing and at harvest.

2.1.8 YIELD COMPONENTS

Productive tillers

Total numbers of tillers were counted in the five tagged hills at harvest.

III. INDENTATIONS AND EQUATIONS

3.1 PERCENTAGE OF PRODUCTIVE TILLERS

3.1.1 Leaf area Index (LAI)

Five hills outside the net plot were selected at random used for calculating LAI. Leaf area index was worked out by the method as suggested by Palaniswamy and Gomez (1974) using the following formula.

$$LAI : L \times W \times K \times \text{Number of leaves per hill Spacing adopted cm}^2 (1)$$

Where

L maximum length of the 3rd blade from the top in cm

W maximum width of the leaf blade in cm

K Factor of 0.75 for Kharif season rice

N Number of leaves per hill

P land area occupied by a plant in cm

3.2 YIELD COMPONENTS

3.2.1 FILLED GRAINS PER PANICLE

The ear heads selected for recording the panicle length were used for counting the number of filled grains per panicle. Thousand grain weight One sample of 1000 grains from each plot was taken and weighed and expressed in gm.

3.3 GRAIN AND STRAW YIELD

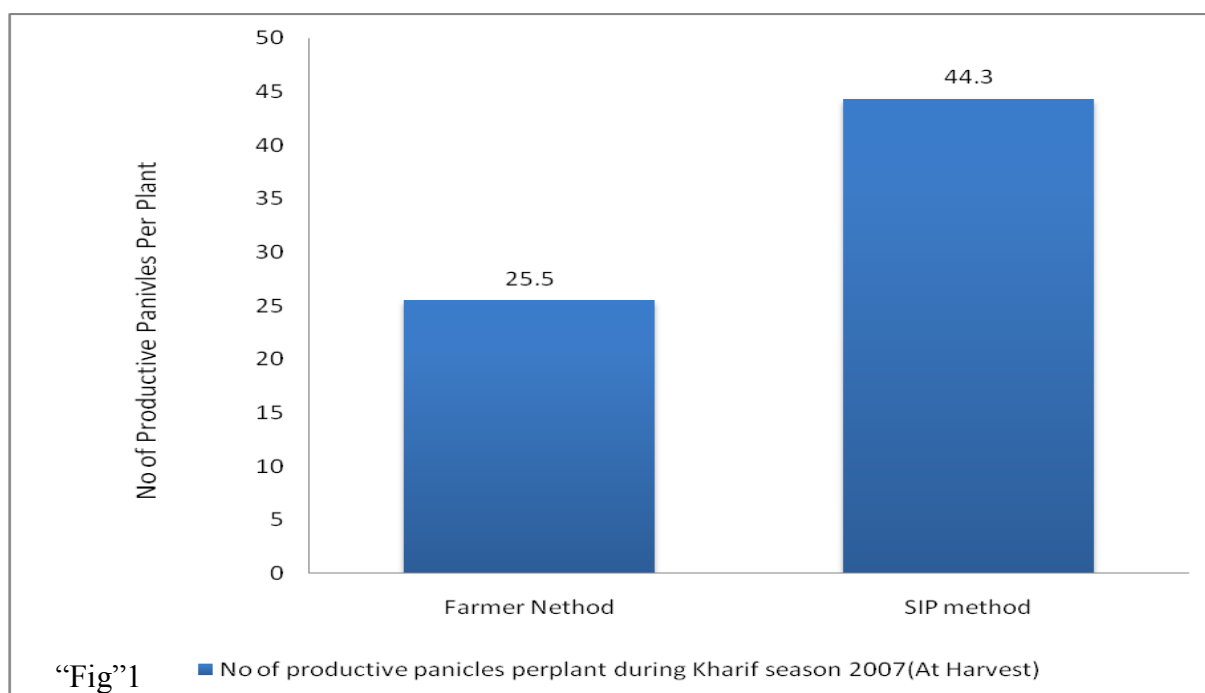
Grain and straw yields were recorded at harvest from the net plot and the grain yield in expressed at 14 percent moisture level. The straw was sun dried and yield recorded.

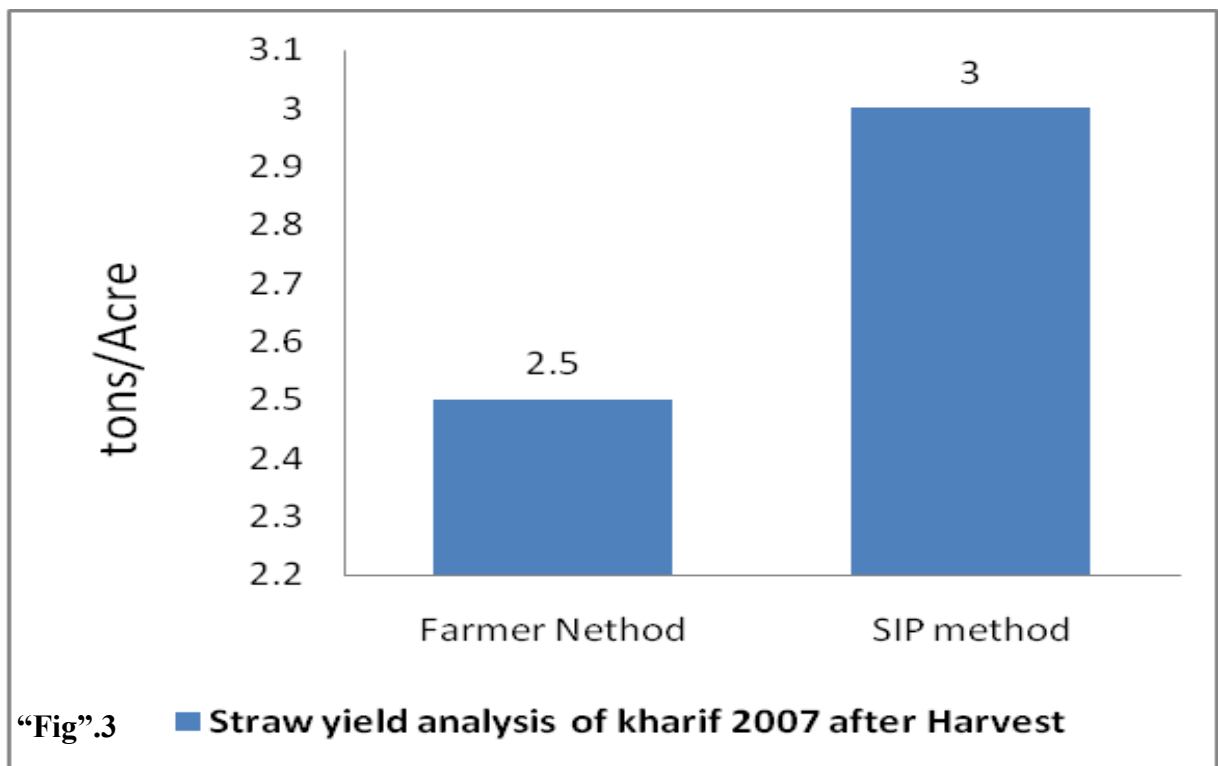
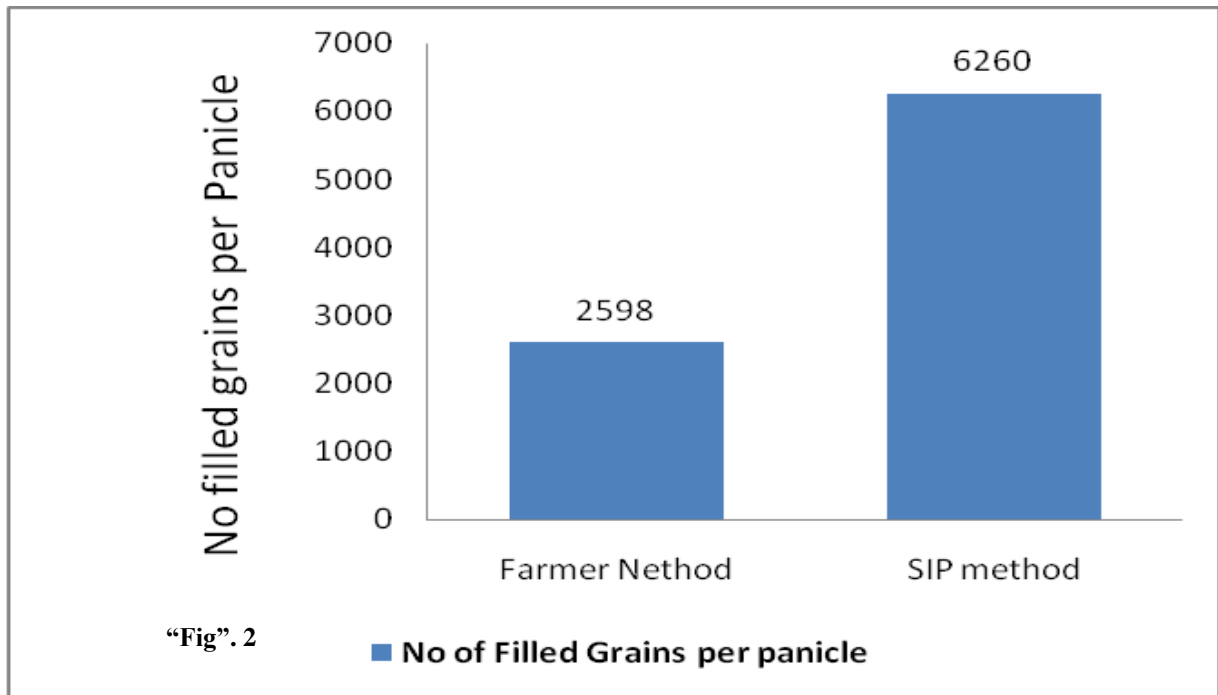
Harvest Index

The harvest index was calculated using the following formula

$$HI = \frac{\text{Grain yield} \times 100}{\text{Grain yield} + \text{Straw yield}} \quad (2)$$

IV. FIGURES AND TABLE





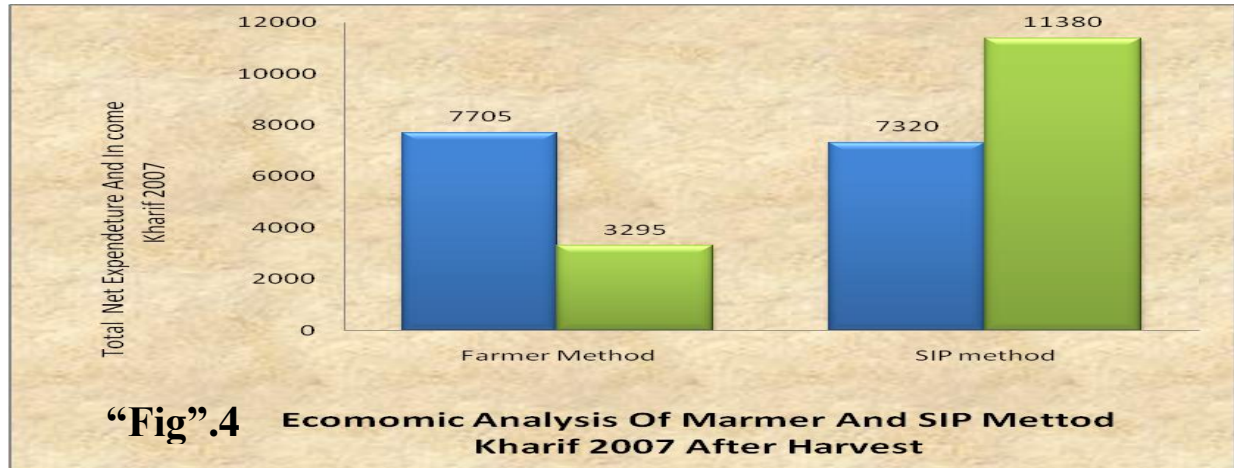


TABLE NO.2 Number of productive panicles per plant (at harvest)

Treatments	Farmer method				Average
	FYM+DAP(25Kg) +Urea(25kg)+ Ammonium Sulphate(8kg)/1/2 Acre	25	26	26	
FYM+NPK+NSKE +Panchagavya+Tank silt+Feso ₄ +Znso ₄	SIP Method				Average
	45	42	44	43	
Difference in no's	20	16	18	18	18.7

TABLE NO.3.NUMBER OF FILLED GRAINS PER PANICLE

Treatments	Farmer method				Average
	FYM+DAP(25Kg) +Urea(25kg)+ Ammonium Sulphate(8kg)/1/2 Acre	2805	2660	2442	
FYM+NPK+NSKE +Panchagavya+Tank silt+Feso ₄ +Znso ₄	SIP Method				Average
	6300	6322	6129	6289	
Difference in no's	3495	3662	3687	3802	3662

TABLE .NO.4.STRAW YIELD ANALYSIS (TONS) (AT HARVEST)/1/2 ACRE

Treatments	Farmer method				Average
	FYM+DAP(25Kg) +Urea(25kg)+ Ammonium Sulphate(8kg)/1/2 Acre	1.25	1.25	1.25	
FYM+NPK+NSKE +Panchagavya+Tank silt+Feso ₄ +Znso ₄	SIP Method				Average
	1.5	1.5	1.5	1.5	
Difference in (ton)	0.25	0.25	0.25	0.25	0.25

TABLE .NO.5.ECONOMIC ANALYSIS OF FARMER AND SIP METHOD OF PADDY CULTIVATION / ½ ACRE DURING KHARIF SEASON 2007

Particulars	Conventional/Farmer method		Semi irrigated method	
	Qty	Total	Qty	Total
Labors	46	2760	47	2820
Bullock plough	5	1000	4	800
Threshing machine/tractor	4	2000	4	2000
Other expenditures	-	1945	-	1700
Total expenditures	-	7705	-	7320
Grain yield(qt)	10	10000	17.50	17500
Straw yield(ton)	1.25	1750	1.5	2250
		11750		19750
Total net income	-	4095		12430

V. CONCLUSION

The present experiment was carried out from July 15th 2007 to November 2007 to evaluate the eco-friendly and farming and their economics in a paddy based cropping system. The experiment was laid out in command area with one replication. The conventional farming treatment received full dose of recommended NPK, weed control, through herbicide and plant protection by chemicals, in SIP method weed control through manual weeding and plant protection by Neem products. The plant protection was done through Neem oil 3% and NSKE 5% were used for plant protection. Seed treatment by using Azosapirillum inoculated. Tricograma Japonicum was used as biological control of stem borer and leaf folder respectively. The summary of the salient results obtained from the study and conclusion drawn are given below.

- [1] Application of recommended NPK FYM+TANKSILT+NSKE+PANCHAGAVYA application improved paddy panicle, plant height to a greater extent.
- [2] The root shoot leaf panicle were enhanced by application of FYM+NSKE+panchagavya, conventional farming recommended DAP (25kg) urea(25kg) ammonium sulphate 25kg ½ acre.
- [3] In general number of Filled Grins was increased greatly by the application of FYM+ tank silt +NSKE+panchagavya, conventional farming recommended DAP urea Ammonium sulphate and FYM+tank silt+ manure.
- [4] FYM+NSKE application improved LAI and this was followed by FYM+panchagavya, conventional farming recommended DAP (25 kg), urea (25kg) Ammonium Sulphate 8kg per ½ acre.
- [5] Straw yield also was higher with the application of FYM +TANK SILT +NSKE+panchagavya.
- [6] Application of FYM+NSKE+tank silt +panchagavya markedly improved paddy yield and it was better than the inorganic sources.
- [7] Neem oil and NSKE and releases of trichograma Japonicum effectively controlled stem borer, leaf folders.
- [8] Conventional farming recorded higher net returns Rs.4095/1/2acre for kharif season 2007.the next best was FYM+NSKE+TANK SILT+panchagavya application Rs.12430/half acre in kharif 2007.



Photo No 1. General View of the Farmer and SIP Method



Photo No 2. Height and Length of Root and Plants of Farmer and SIP Method



Photo No 4. Threshing and harvest

VI ACKNOWLEDGEMENTS

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