A Zero Till, Conservation Agriculture Technique for Rice Based Farming

❖ What is SRT?

Saguna Rice Technique is a unique new method of cultivation of rice and related rotation crops without ploughing, puddling and transplanting (rice) on permanent raised beds. This is a zerotill, Conservation Agriculture (CA) type of cultivation method evolved at Saguna Baug, Neral, Dist. Raigad, Maharashtra, India. The technique has been accepted by Government of Maharahtra for their PPP-IAD programme where about 1200 farmers have reported overwhelming satisfaction and about 500 farmers have not reported yet.

It reduces water requirement by 50% for rice (3000 litres water required to produce 1 kg of rice) cultivation, reduces back breaking labour by 50%, cost of production by 40%. It also stops emission of greenhouse gases and effectively does carbon sequestration to improve soil fertility. Above all it brings joy and confidence to the rice farmer which is reversing the trend of farmers giving up farming.

❖ What’s so special about SRT?

The Rhizosphere, which is the natural ecosystem around the roots benefits greatly by the permanent raised beds system. The most important friends of any plant growth are aerobic microorganisms and earthworms. These essentially need oxygen and organic carbon for them to flourish. The raised beds further facilitate the adjustment of moisture to optimum levels. Together these conditions promote vigorous, hairy whiteroots and vibrant, wider leaf lamina resulting crop to grow uniformly vigorous and gives considerably higher yield.

The SRT iron forma (the tool will be better soon) facilitates planting of crop in predetermined distances enabling precise plant population per unit area. Absence of puddling and transplanting of rice makes it possible for “Not dependent on erratic behaviour of
rain.” This means ‘No more waiting for Rain God to shower just optimum rain for best transplanting operation’. Similarly if rain vanishes for few days during crop season it doesn’t lead to cracking of land or ‘crop kill’ immediately.

❖ Multiple advantages of SRT!

1) For not having to do puddling, transplanting and hand hoeing, saves 50% water, 40% cost of production & not requiring transplanting saves 50% treacherous labour.

2) SRT insists keeping of roots of previous crop in the raised bed. The capillaries formed by dead dry roots and earthworm pathways facilitate quick draining of rainwater resulting in effective recharging of Aquifers.

Conventional transplanting method (Lavni)   Conventional seedling (Rab) for transplanting

3) Loss of valuable silt (about 20%) during puddling can be prevented thus more fertile land can be handed over to next generation.

4) Leaves of rice plants on SRT beds seem to be more broader and head more upwards to sunlight than their counterparts in conventional method. They are likely to produce more biomass, means higher yield.
5) SRT has ability to bring “Vigorous Uniformity” and higher yields in all soil types even in degraded soils and socio-economic groups. For example a very new farmer and well established awarded farmer and agricultural universities will attain about the same higher yield per unit area.

6) Hand hoeing is strictly avoided in SRT. Once again this reduces hard-work and loosening of top soil making it vulnerable for washing away.

7) Today’s recommend dose of fertilizer can be brought down considerably.

8) A good number of earthworms are noticed on SRT beds during high rainfall days attracting unusual birds to SRT plots. This magic is due to supressing all green growth with glayphoset, which decays and becomes instant food for the worms. Also ‘No-Till’ prevents destruction of E’worms life. Thus SRT proves to be Eco-friendly Farming. This is big positive gain.

9) The root network prevents soil from cracking and makes it more spongy. The same roots become valuable source of organic carbon which is uniformly distributed and oxygen pathways to root zone of next crop.

10) Avoiding of puddling will drastically reduce diesel consumption, emission of CO₂ over thousands of acres of paddy cultivation. Also SRT being aerobic method it will prevent methane generation. Both CO₂ and methane are responsible for global warming.
11) The **traumatic shock** caused to the rice seedlings **during transplanting** is avoided in SRT. This reduces possibility of pest & disease problem.

12) Rice crop gets ready 8–10 days earlier. Also it saves time required for soil tilling between two crops. This leaves valuable 10–15 days of crop season for the farmer enabling him to take more than one crop in the same plot in a year.

13) SRT is feasible for organic farming method.

14) Due to excessive water in low-lying plots removing of harvested paddy from the plot for drying can be avoided with SRT raised beds.

15) During milling of paddy, SRT will yield higher percentage recovery of grains.

16) Non-use of heavy agricultural machinery for tilling in field will prevent compaction & formation of hard pan of lower strata of soil enabling better percolation of water into dipper soil & permanent establishment of earthworms.

17) It is possible to get high returns (more than ₹ 5,00,000 per hectar per annum) with crop rotation such as Basamati Rice (PS-5) in Kharif, leafy vegetables in Rabbi, Bold Groundnut (W-66) in Summer, while improving health of the soil.

18) This could be the best solution in natural calamities such as hail storm, floods, cyclones, untimely rain-storms, etc. because the crop cycle is shortest (NO TILL) and it involves multiple choices of short-term rotation crops such as pulses, vegetables, onion, sun-flower, groundnuts, and so on.

19) SRT can recover from damage caused by lashing, scrubbing & degradation of soil by natural calamities in quickest possible time.

- **SRT Planting Method:**
In this method we have to till the soil and make the raised beds only once. **The same permanent beds will be used again and again to grow various rotation crops after rice in Kharif season.** Please study the multiple advantages over and again; also try your own permutations and experimentations. But pay real good attention in making these permanent raised beds.

The best time to make these beds is immediately after kharif paddy harvesting, is in October. Good ploughing and tilling can be done with available residual moisture or by giving irrigation. Add desirable and / or available quantity of any organic manure. Finally till it with rotavator or power tiller to make it workable.

Draw parallel lines with help of rope and lime or wood ash at 136 cm i.e 4.5 feet apart. Use tractor drawn ‘Bed maker’ or any other means to open furrows at marked lines and make raised beds.

Make depressions / holes with SRT iron forma on the raised beds. Sow / dibble 2 seeds of either Wal beans (Kokan Wal no. 2) or Gram (Vijay), or bush type Cowpea (Kokan Sadabahar) or Horse Gram (Dapoli no. 1) as per recommended variety and distances. Apply fungicides and / or beneficial microorganisms to the seed as per the agriculture university guidelines. Irrigate plot with best possible available method. 3 to 4 hours later spray the plot with selective weedicide Goal (Oxyfluorfen 23.5% EC) @ 1 ml per litter of water. The crop
is ready for harvest till 3rd or 4th week of February. Cut the plants leaving roots and 2 to 3 inches stem on the beds.

Its very important to leave the roots of previous crop in to soil and spray the plot with Glyphoset (15 lit water + 70 ml Glyphoset + about 200 g of sea salt or 150 g of Urea) 2 to 3 days after harvesting.

Summer moong beans are to be planted after the winter crop on the same beds between 25th February to 10th March. SRT iron forma and selective weedicide like Goal are to be used.

Same raised beds are to be used again without any ploughing or puddling or transplanting for next Kharif rice crop.

1) Approximately 3–4 days before rain begins, make holes on beds by SRT iron forma and put 3 to 4 treated rice seeds in each hole, press it with mixture of manure or good soil (10 Kg. manure and 400 g. Suphala)

2) Next day after the first rain spray selective weedicide Goal (Oxyfluorfen 23.5% EC) @ one ml per litter of water.

3) At about 4 leaf stage carryout gap filling by using extra seedlings from nearby hills.

4) Between 25 to 30 days carryout manual weeding without walking on beds and press a Urea (DAP) brickets or one tea spoonful of Suphala in between 4 hills / plants.

5) Soon the plots will start looking very nice. We need to pay attention for control of crabs (press Gliricidia leaves in holes & plug with mud), clean bunds, water levels in the plots and so on.
6) Its good idea to make a simple light trap for insects, stay in touch with experts of university and control pest problems just in time.

7) 2 to 3 days after harvesting of paddy spray Glyphosate as mentioned above.

❖ **Important Principles:**

1) SRT insists that all roots and small portion of stem should be left in the beds for slow rotting.

2) Weeds are to be controlled with weedicides and manual labour. No ploughing, puddling and hoeing is to be done to control weeds.

3) This system will get the crop ready for harvesting 8 to 10 days earlier. Take this into consideration while choosing a variety to avoid getting harvesting caught in receding rain.

❖ **Appreciation of SRT by great personalities:**

Great Guru of Agriculture, Prof M S Swaminathan

Director General, ICAR, Dr S Ayyappan

Dr. Sant Virmani, Sr. Scientist (Ret) IRRI

Team World Bank, Washington DC with Dr R Samantaray, N Delhi
Dr Yitzak Spegale, Ex Director of Res, ARO, Israel

Dr Sharadchandra Kulkarni, Ex Dir NIBM, Dr Vasudha Kamat, VC SNDT

Dr. Girish Sohani, President, BAIF, & Shri MV Ashok, CGM, NABARD

Dr. D.G. Bhapkar, Ex Rice Specialist

Appreciation of SRT by DR. Jayantrao Patil, Bordi, Dahanu.
Some the farmers out of 30 of them who tried SRT in Kharif of 2013:

- Bhivpuri, Karjat
- Mircholi, Karjat
- Janakalyan Trust, Mahad
- Karalewadi, Karjat
- Dahiwali, Karjat
- Interested farmers at the SRT Farmers' Meet.
Appreciation of SRT efforts by Prof. M. S. Swaminathan:

MSS/DB/
5 April 2014

Shri Chandrashekar H Bhadsavle
shbhadsavle@gmail.com

Dear Bhadsavleji,

It was a pleasure meeting you and your colleague and learning about the sustainable farming practices you have developed. I am grateful to you for your efforts to popularize Zero till in rice based cropping. You are a role model for all farmers and I wish you continued success.

With warm personal regards,

Yours sincerely,

M S Swaminathan

================================

PROF M S SWAMINATHAN
Founder Chairman, M S Swaminathan Research Foundation
Third Cross Street, Taramani Institutional Area
Chennai - 600 113 (India)

Appreciation of SRT efforts by Dr. Amir Kassam

Dear Shekharbhai,

I am most impressed with your effort to promote no-till SRT approach. You have shown beyond doubt that no-till rice on permanent broad beds work better that other conventional methods.

I would really like you to see how you can develop and maintain soil mulch cover using crop residues so that SRT can benefit from Conservation Agriculture (CA) practices. Please see www.fao.org/ag/ca for more information.

I operate a simple information exchange network on CA and I would like to subscribe you to the listserv.

Best regards.

Amir Kassam.
I know Mr. Chandrashekhar Bhadsavale from last 30 years. After receiving M.S. degree from University of California he returned to his farm in India and has been doing research to increase productivity of rice. He has developed SRT method which has been widely adopted by farmers and have increased their rice productivity.

I have studied SRT and my observations are as under.

Due to direct seeding of rice there is no need of puddling. The puddling results into soil erosion and thereby loss of soil fertility.

Due to direct seeding there is no need of transplanting. So the cost is reduced.

The farmers are unable to do transplanting due to shortage of labour. Late transplanting results into low yields.

Rotation of crops after rice harvest gives extra income to farmers. The roots of these crops again increase organic content of the soil.

Bordi
November 25, 2014.

Link for SRT video documentary:
Marathi: Part 1:  https://www.youtube.com/watch?v=Cb2VFFJiQE
Part 2:  https://www.youtube.com/watch?v=syLoNJ87QlQ
Part 3:  https://www.youtube.com/watch?v=syLoNJ87QlQ

English: Part 1:  https://www.youtube.com/watch?v=Ncp6U-G3e2E
Part 2:  https://www.youtube.com/watch?v=jEzXp4WUXXU

Detailed book released at FAO Rome (23rd Sept 2015) is available at srt.kisan.com