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Better way of Agriculture

1) Seed and seed materials:

Sorting & grading of seeds and seed materials: The seeds must be from reliable sources, unmixed and as far as avoidance of physical damages, chaffy grain, diseases and insect infected seeds.

Materials: E.g. Paddy seeds: 5 kg, two 10 lit capacity buckets, Fresh water, 1 kg common salt, one good egg/potato.

Process:

- 1) Take 3 lit of water in a bucket; put an egg/potato in water. The egg/potato must sink in the water.
- 2) Take out the egg/potato and add 300-400 gm of salt, mix well, again put the egg/potato and see whether it sink or not,
- 3) If it wouldn't sink, add salt further and mix well, put the egg/potato, see again whether it sink or not,
- 4) Once the egg/potato float, stop adding salt and put seeds, mix well, discard all the floated seeds,
- 5) Take out the seeds from the salt water, wash 2-3 times with fresh water to remove salt,
- 6) Keep the seeds for germination by treating with Beejamrith/cow urine and butter milk.
- 7) Sort the rest seeds using the same salt water left.

The details of seed treatment is given below-

A. Beejamrutha (BA): This product is used for treatment of seeds. How to prepare BA?

Materials requirement for BA: Take 4 lit water, 1 kg cow dung, 1 lit cow urine, 10 gm lime, 5 gm turmeric powder, 100 gm gud and 1 handful virgin soil.

- a) Keep the cow dung in a cotton cloth and tied with a thread and dip the item overnight in 4 lit of water. Also dip the lime in 50 ml of water for overnight.
- b) In the next morning, gently squeeze the cow dung kept container in the water.
- c) Mix the handful soil from the fertile natural soil, turmeric powder and lime water properly. Mix all the material properly and use the mixture for seed or seed material treatment.

Dip the seeds or seed materials for 10-15 min and then sow/transplant. The roots/tuber/cutting also can be treated just by dipping in the solution for 10-15 min before sowing/transplantation.

- B. 1: 10 diluted cow urine and water solution:** Seeds or seed materials can be dipped for 10-5 min followed by treatment with **Butter Milk** and use them for sowing. Before sowing, just ensure shade drying of seeds or seed materials.
For paddy kind of seeds, can be kept for sprouting (just emergence) for sowing in the nursery.
- C. Hing & Turmeric powder based water:** Take 1 gm hing and 10 gm turmeric powder and mix with one lit water: Dip roots of the seedling of different vegetable 10-5 min just before transplantation. This way seedling can be protect from soil borne fungus.

II) Soil Nutrients management by adding microbial cultures:

Microbial cultures as organic fertilizers:

- 1) **Jeevamrith:** This is a kind of microbial mix culture based organic fertilizer that can be used as catalyst to multiply micros in the soil. This culture significantly contributes major nutrients N, P & K along with many micro nutrients.
 1. Take 20 lit water in a container and mix 1 kg cow dung, 1 kg cow urine, 100 gm gud, 100 gm **bason/pulse flour** and one handful fertile soil (no chemical affected),
 2. Mix all the items in the water properly,
 3. Keep the mixture for 72 hours for fermentation,
 4. Ensure one time stirring in the evening clockwise,
 5. The JA becomes ready to use after 72 hours.

How to use:



Direct drenching: 60 lit JA can be used directly in the standing crop with irrigation water or broadcasting by diluting 10 times with water.



Use in vegetable/horticultural plant: Can directly drench in the basin area as diluted (1:10) condition. For vegetable, it can be applied with irrigation water or can put in the basin area as diluted one (1:10).



Foliar spray: JA can be filtered by passing double layer cotton cloth and spray as foliar @5-10% for young and matured crops in the evening hours. It acts as good fungicide and also bactericides. It also acts as good plant growth hormone. Spray @ 15 days interval is fine. One can spray 2-3 times in a crop.



Used as Ghana JA: Apply @ 60-75 kg per bigha, for 2-3 doses.



JA must be used within 3-7 days of preparation.

- 2) **Ghana Jeevamritha (GJA):** This is a well decomposed organic matter based bio-fertilizers that can be stored for a year and apply in the crop, field as requires. It's preparation and application is very simple.

How to prepare GJA:

- Take 200 kg well decomposed organic FYM/vermin compost and well sieved.
- Put 20 lit JA and mix with the compost properly, add water if require to keep it with sufficiently moist.
- Make a heap and cover with jute bag and keep for 48 hours of incubation in a shady place, safe from rain,
- Pack the compost in jute bags and store in a cool place and ensure from rain,
- It can be stored up to 12 months.

Application of GJA

- A) Apply 60-75 kg per bigha of land. At least 2-3 application may be given in a crop.
- B) For plantation crops/vegetable-GJA can be used in the basin area. After application, it should be covered with soil or mulch materials. In the soil, there must be sufficient moisture.
- C) GJA also apply by making small ball by mixing with water and put in the soil on

triangular fashion making hole and cover with soil. The quantity may be 50-100 gm for vegetables (tomato, brinjal, chilli etc.) and 250 gm to 500 gm for plantation crops.

3) **SRI PRANAMRIT:**

This is product made with **poultry litter (30 kg), rapeseed /muster cake (5 kg), kitchen ash (10 kg) and fresh water (40 lit)**. The detail preparation process are described as below-

- ❖ Take utensil/drum/cemented or earthen vessel with 100 kg of capacity,
- ❖ Take 30 kg poultry litter, 5 kg of muster cake and 10 kg kitchen ash and 40 lit water,
- ❖ Mix all the materials in the water and keep in the drum and keep for 4-5 days with a cover. By 4-5 days, the product will be ready for use.
- ❖ The above quantity of SRI PRANAMRIT is sufficient for **1/2** a bigha land for the crop.
- ❖ This product can also be applied any crops.
- ❖ Half the quantity is required during 1st and 2nd weeding of the crop.

Cow dung water mixture: This is another organic culture that can enhance soil fertility in terms of multiplication of microbial population in the soils.

One can easily prepare it just by mixing 5 kg cow dung into 15 lit cow urine, keep for 15 days for fermentation. Stir once in a day. Cover the container with a jute bag.

Application: Take one lit of the fermented mixture into 10 lit water, mix it and filter through cotton cloth and spray in the standing crop in the evening or early morning. **This product can be stocked up to 2 months.**

Vermi Wash/compost Tea: This is very easy to prepare and can be applied in the growing/flowering/fruited crops.

How to prepare??

- 1) Take a container of 20 lit capacity and fill with 10 lit water, mix good quality vermin compost,
- 2) Mix well and keep for 48 hours. Stir 2-3 times in a day,
- 3) On day 3rd, filter the mixture with cotton cloth and store in a container,

Application: Take one lit of Vermo Wash/Tea and mix with 4 lit of water, spray in the morning to any standing crops. Repeat after 7 day.

Cow urine as liquid fertilizer:

Fermented cow urine contains high concentration of NPK (2.7%,2.4%, 3.8%), Ca-5.8%,Fe-7692 ppm and its pH is 8.7. This can be applied as liquid fertilizers to supplement NPK along with other micro nutrients. This is recommended @ 1 lit cow urine into 10 lit of water and can spray in the evening/early morning hour to growing crops. It also acts as pesticides, viricides.

Pesticides:

- 1) **Handi Dwa:** This is an herbal products(extract) used as broad-spectrum pesticides. **Materials requirement:**

1 kg cow dung, 4 lit cow urine, 1 kg leaves of each plant as mentioned below:

Neem, custard, bel, castor, calotripi, dhatura, bera kalmi, papaya, Puttus etc.,

Also take 1 kg tobacco leaves/left out, **garlic 250 gm, ginger-250 gm, chilli-250 gm**, 50 gm **Gud**, 1 handful termite soil,

How to Prepare?

- All the plant materials grind in to small pieces and properly mix with urine, cow dung, gud, termite soil
- Keep the materials in a earthen pot for fermentation for 7 days,
- Put 1 lit cow urine on 7th day and again mix and keep for next 7 days,
- On 14th day, take out the material from pot and squeeze properly and store the liquid comes out from the materials in to a container after filtering.
- The materials again put in the same pot for the another 7 days and add 1 lit cow urine,
- On 21st day, again squeeze liquid in the same process, store and put the material in the pot by adding 1 lit cow urine, this way one can go for extracting liquid in every week till 24-25 weeks (**6 months**) and use the liquid as broad spectrum pesticides.

How to apply:

- 100 ml katha(extracted liquid add in to 5 lit water for matured plants/crops or 10 lit water for young plant/crop/seedling.
- Spray must ensure in the evening /early morning hour only.
- Keep the extract out of reach to children,
- Use hand gloves/plastic bag for extraction to avoid bad odour.

2) **Aghniastra**: Herbal extract can be applied to manage aphid, thrips, leaf roller, fruit and shoot borer, steam borer etc. **Storing period: 3 months**

Materials requirement:

5 lit cow urine, 500 gm tobacco leaves, 250 gm pungent green chilli, 250 gm garlic and 2.5 kg neem leaves (grinded),

How to prepare:

- ❖ Take a utensil (iron/earthen),
- ❖ Put urine, grinded garlic, chilli and neem and tobacco leaves,
- ❖ Boil the materials till 1/5th volume of the liquid
- ❖ Keep for 24 hours of fermentation,
- ❖ Filter with cotton cloth and store in a cool room.

How to apply:

100 ml for 5 lit of water, spray in the evening or early morning hour.

3) **Neemastra**: This is an herbal extract that can be applied against fruit and shoot borer, stem borer, fruit borer, sap suckers etc. **It can be stored up to 6 months.**

Materials requirement:

5 lit cow urine, 5 kg cow dung, 100 lit water, 5 kg neem leaves and fruits (grinded).

How to prepare:

- ❖ Take 100 lit water in to a container
- ❖ Mix all the materials one by one in the water
- ❖ Keep for 24 hours for fermentation,

- ❖ Stir twice in a day with a stick,
- ❖ Filter the materials through a cotton cloth and store the liquid in a cool place.

How to apply:

Add 100 ml of the Neemastra in to 5 lit water mix well and spray. It also works against mealy bug.

- 4) **Brahmastra:** This is another herbal extract effective against fruit borer, stem borer and all sap suckers(thrips, white fly) etc.

This can be stored up to 6 months.

Materials requirement:

5 lit cow urine, 1 kg grinded leaves of each plants – Neem (1.5 kg), custard, castor, bera kalmi, papaya, bel, dhatura,

How to prepare:

- 1) Take a utensil(earthen/iron) and put 5 lit cow urine
- 2) Add all the grinded materials in the cow urine and boil till 1/5th volume
- 3) Keep for 24 hours of fermentation
- 4) Filter through a cotton cloth and store in a cool place

How to apply:

Add 100 ml **Brahmastra** in to 5 Lt water mix well and spray in the evening /early morning hours.

Garlic, Ginger and chili paste mixture: Its effective against leaf sackers-aphid, leaf minor, thrips, whitefly, green looper, larvae of fruit borer, stem borer etc.

How to prepare??

- ❖ Take 125 gm garlic tube and mix with 15 ml kerosene oil. Keep the kerosene oil mixed garlic for overnight, in the morning, make a paste of it.
 - ❖ In the same morning, make paste of 65 gm ginger in a separate container by adding 10 ml water,
 - ❖ Similarly, make paste of 65 gm green chilli in another container by adding 10 ml water,
 - ❖ Mix all the three paste into 12 lit of water, add 1 packet of 1 Re shampoo, mix well,
 - ❖ Filter the mixture with cotton cloth,
 - ❖ Spray within 4 days of preparation.
- 5) **Garlic kerosene water emulsion:** This product is effective to protect fruits and vegetables against fruit fly attack. Take 100 gm garlic bulb and dip in 20 ml kerosene oil for overnight. In the next morning, grind and make paste of the garlic and mix with 10 lit water, mix well, leave for few min to get settle down. Filter the same and spray the filtrate in the evening hour.
- 6) **Turmeric powder and Ash mixture:** This product can control sucking pest such as aphid, thrips etc. take 100 gm Ash and 100 gm turmeric powder, mix well with 10 lit water and sprinkle over the crops.

Fungicides:

1) Butter milk(very sour):

- This is a very effective bactericides, fungicides, viricides and growth hormone and enzymes.
- Take filtered 500 ml butter milk and mix with 10 lit water,
- Spray in the evening/early morning hours in any crops especially crop growing, flowering, fruiting stage as growth enzymes ,

- Spray in any crops any time against diseases.
- 2) **Hingastr (Ref. Patanjali Gramuddok):** This is a very good fungicides. It's prepared with cow dung (5 kg), 7 lit cow urine, 5 lit water, 200 gm hing, 150 gm lime and 500 gm gud.
 - a) Take a container and put 5 kg cow dung , 7 lit cow urine and 500 gm gud in to 5 lit water, mix properly and keep for 4 days for fermentation. Stir once in every day.
 - b) On day 5th , add 200 gm hing and 150 gm lime and keep for another 4 days covering with jute bag.
 - c) On day 10th , filter the materials, store in a container.
 - d) Spray by adding 5 lit Hingastr into 10 lit of water and mix well, spray in the evening hour.
 - 3) **Soothastra:** This is a good fungicide
 - a) Take 25 gm sooth (dried ginger), grind it, add 250 ml water, boil the same.
 - b) On reduce the volume by ½ stop boiling, keep for cooling.'
 - c) In another container, take 250 ml milk of cow/buffalo/goat, boil it and keep for cooling,
 - d) Take a drum with 25 lit water, add both sooth and milk, mix well, filter the same and spray,
 - 4) **Garlic water:** Its broad spectrum in nature can be applied for controlling multiple pests.
 - a) Take 100 gm garlic, grind it,
 - b) Take 10 lit cow urine and mix with garlic paste, keep for 7 days by covering the container with jute/cotton cloth,
 - c) On day 7th , filter the mixture with cotton cloth,
 - d) Take 1 lit and add in to 10 lit of water, mix well, spray in the evening.
 - 5) **Neem oil:** This acts as strong repellent and creates anti-feeding condition in the pest mostly belong to lepidopteron group. Take 50 ml oil in to 10 lit water and also add a one re shampoo, mix well, spray in the evening hour.

Plant Growth Stimulants, enzymes:

- 1) **Butter milk** @500 ml per 10 lit water as foliar spray
- 2) **Cow urine:water@1:10** as foliar spray
- 3) **Wermi wash/compost tea: Its preparation detail is given above.**
- 4) **Foliar application of JA(filtrate)@10%: Its preparation detail is given above**
- 5) **Gunapaselam(Fish Masala extract):** This is an excellent plant tonic, it assists plant growth by providing Nitrogen (8-10% of plant's requirement), rich source of amino acid, micro, macro and micro nutrients. It also acts a natural growth promoter and pest repellent, **it also control of root grubs.**

Materials: variety of native fish waste/fishes: 1kg, Jaggery/molasses: 1.5 kg

Process of preparation:

- 1) Cut the fish in to small pieces,
- 2) Take a plastic bucket/mud pot and mix the cut fishes into jiggery/molasses,
- 3) Tie the mouth of the bucket with a jut bag to prevent entry of any insect/fly,
- 4) Keep the container far away from household to avoid bad odors,
- 5) From 5th to 20th day onward, stir once in a day,
- 6) Disappearance of bad smell is the indicator of the product get ready,

- 7) Filter the solution through a strainer and the filtrate will look like honey based syrup,
- 8) Keep the filtrate in to glass jar and cover tightly
- 9) It **can be stored for 6 months**,

Application as foliar spray: Spray @3-5% with water in the evening/early morning to any crops in the growing, flowering and fruiting stages. This can be used with irrigation water. Product from 1 kg fish is sufficient for one bigha of land.

Know Your Soil whether it's dead or alive??

This is very important to understand your soil in terms of its health and capacity to produce yield expected before sowing of any crop. The basic enquiry (Thump rule) will be helpful to take necessary management practices for piece of land. Otherwise, someone is having sufficient investment capacity may face huge economic loss as well as further deterioration of soil quality. One can only expect bumper yield once it becomes sure about soil health, good quality inputs and management practices.

There are few simple tests that may give us some clues about soil and its nutritional status in terms of physical, biological and chemical condition. This test can be done by a farmer at his field level.

1. Soil block Test for presence of earth worm:

The earthworm has been called "The Gardeners Unpaid Handyman". It tills the soil around root areas by its tireless burrowing. The burrows form channels through which root growth may reach down into the subsoil for minerals and moisture. They also absorb rainfall quickly for storage in the soil instead of allowing it to run off, carrying away valuable top soil. Most important of all, the earthworm eats, digests and enriches dead and decaying vegetable wastes in the soil, ejecting it in the form of castings, rich in plant food value, water-soluble and immediately available to plant roots. Earth worm population in the soil indicates good soil health with good environment for different organisms (both Macro and micro-organisms). No earthworm means danger signal for us i.e. soil is dead or moves towards it.

How to conduct the test:

Dig out 1 cubic feet of soil blocks from 3 different conditions (chemical affected homestead and virgin forest soil and explore presence of earthworms, count the number of earth worms available in the soil block separately.

Indication: For healthy & lively soil, the earthworm population must be **25 (1 million per acre)**,but affected soils have below 2-3 or even zero,

Discussion: Water infiltration and absorption rate, run off, soil aeration, porosity, and permeability, worm's cast and moisture absorption and plant use, Nutrients availability, soil respiration etc.,

Do you know??

- 1) In a health soil, forty tons of casting per acres moving through earthworm body daily- a study in England,
- 2) 1.5 million Worms per acres move 20 ton of soils per year – a study by USA.
- 3) Earthworm castings contain five times more nitrogen, seven times more phosphorus, 11 times more potassium, and 1,000 times more beneficial bacteria than the material contained before the

earthworm ingested it. The N-P-K ratio for worm castings is 0.5-0.5-0.3 consisting of 50% organic matter and 11 trace minerals.

- 4) Earthworms also secrete calcium carbonate, a compound which helps moderate acid or alkaline soil toward desirable neutral pH over time.

2. Soil Aggregate stability Test:

Materials: Three samples of 1000 gm soil aggregates (well dried) from three different fields

- a) One soil sample from a heavily chemicals affected crop field,
- b) 2nd one is from homestead land,
- c) 3rd one is from virgin forest land.
- d) The aggregate sizes may vary from 10-15 gm.
- e) 3 set of transparent 1 lit size beaker with net fitted in the top just 1/4th depth from surface.
- f) 3 lit fresh water.

Process: Facilitator will conduct a test with virgin/forest soils and also with the soils affected due to repeated use of chemical fertilizers, pesticides etc. to show the difference in terms-how fast the soil aggregates degrade and dissolve into water once they place on the net surface fitted under water (**1st test**). **All the three samples will keep on the net surface in the same time with same condition.**

For the 2nd test, how differently water infiltrate in the powdered soil samples of both the types. In the case of **first test**, why clots/aggregates get dissolve slowly or retains its aggregate stability and the other sample why gets dissolves so fast?? What is the interpretation???

- 5) **Water Infiltration Test:** This test assures how quickly water infiltrates/passes through soil column and tells us different interpretations/analysis for different soils.

Materials requirement:

- a) 3 sets of transparent cylinders/beakers with 1 lit capacity,
- b) Three different soil samples (as mentioned above) with rough meshed,
- c) A pinch of robin blue dye

Process:

- 1) Put all the soil samples in the containers,
- 2) Take 500 ml water for each of the sample and pour gently in the soil on same time (Mix color with water for the container where affected soil is filled)
- 3) Observe keenly what happens???

Discussion: Why water infiltrate/passes down easily for forest/homestead samples but couldn't in the case of affected sample, rather remain flooded in the surface mostly??? Infiltration (good/poor), water stagnation, what kind of impacts created for agriculture in terms of soil health, flooding, evaporation, irrigation frequency, more fuel, soil crust, compaction etc.

The discussion may extend up to soil moisture (irrigation) and weed management (chemically), mechanical damages of soil due to tractor/power tiller ploughing, poor organic matter in the soil, disappearing of beneficial insects/ organisms as a result of using chemicals/poison, e.g., Earthworms population & its roles in soil building process, mono cropping, reduction of crop diversity (disappearance of legume, pulses, millets), easy soil erosion and nutrient losses, impact of high uses chemical fertilizers, pesticides etc.

Confirmation: soil is dead or alive-

Least or no presence of earthworms in the soil, maximum degradation of soil aggregates of chemical affected site, water stagnation in the case of affected soil etc. lead us towards the conclusion that the soil affected by repeated uses of chemicals are **Dead**.

The **live soil** means there are higher quantity organic matter (above 1%), well bonded soil particles and abundant of earth worms (>25 per cubic feet of a soil block), *least disease and pest appearance in the crop field, high and stable yields, least water stagnation after rains/irrigation, water leaches down easily, no crust and compaction etc.*

In the case of dead soil, cracks easily develop in moisture stress condition, presence of hard crust/ layer forms after drying up of rain/irrigation water, presence of soil compaction just below plough depth (15-20 cm of depth), and crop root can't penetrate in to soil depth and so least availability of soil nutrients. One may observe easy crop lodging etc., appearance of more diseases and insects in the crop field.

The ideal soil aggregates-

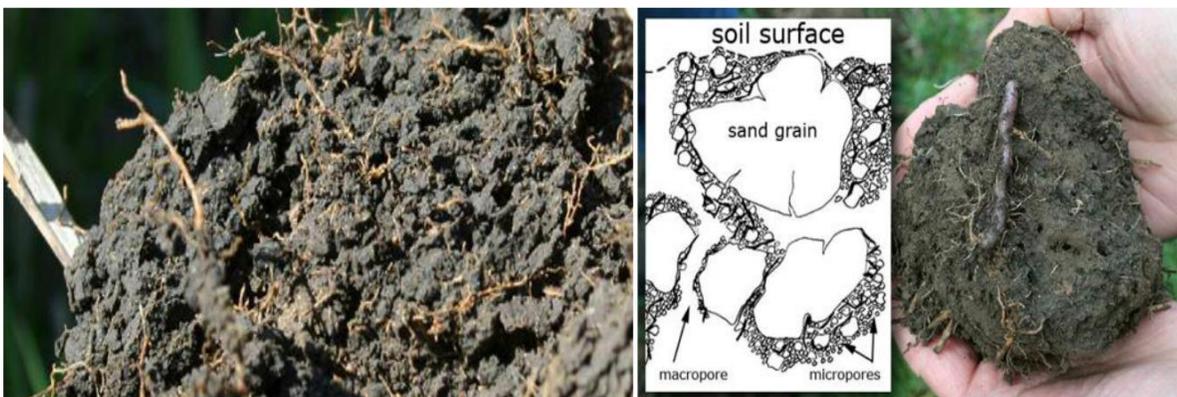


Photo: Crumbly structure of surface soil is associated with adequate organic matter content

High residue and cover crops contribute organic matter to soil



The following measures should be taken into consideration for the revival of soil and better yield from the soil.

- 1) One must go for add on abundant quantity of enriched organic matter/compost (FYM, vermin compost, GJA, other microbial cultures etc), adoption of green manure crops, crop rotation with legumes/pulses, cover cropping, mulching, multiple cropping, mulching etc.
- 2) Focus use of well graded, sorted and organically treated seeds and seed materials, more uses of seeds and seed materials of traditional and HYV variety, practices seed selection and preservation for next season,
- 3) Discourage uses of tractor/power tiller with rotary plough blade rather go for furrow opener blade to minimize soli physical losses.
- 4) Promote prophylactic application of herbal preparations to manage pest, make ridge and furrow during rainy season and bed during winter and summer for effective water management. Promote organic mulches.
- 5) Never apply herbicides even **Glyphosate** which also causes cancer. Go for manual labor, uses small weeding tools and machinery, promote organic mulches.