Organic Package of Practices for Andhra Pradesh

Organic is defined and regulated by the National Organic Production Program (NPOP) or PGS-India Organic program, to get organic certification/ an organic grower must maintain an Organic System Plan and be certified by an Accredited Certifying Bodies that has been approved and audited by the NAB or PGS-India Regional Council.Organic farming explicitly prohibits the use of synthetic or chemical fertilizers, herbicides and pesticides, genetically-modified organisms, sewage sludge, and irradiation.

Organic Farming starts with the Soil: organic agricultural practices to maintain, replenish and balance soil fertility to produce healthy and better tasting crops. Organic farmers use an array of cultural and biological practices to build soil health, manage weeds and pests, and increase biodiversity. Some examples of organic farming practices include:

I. Crop rotations to suppress disease and support beneficial insect communities
II. Cover cropping to fix nitrogen and checking soil erosion
III. Use of biofertilisers; green manuring; vermi compost, EM etc. to enhance soil microbes and deliver plant nutrients
IV. Use of FYM; Compost and vermicompost to build organic matter and manage weeds manually.
V. Use of Bio-pesticides and mechanical controls to manage pests and disease.

Agriculture is the main occupation of about 62 per cent of the people in Andhra Pradesh, one of the agriculturally important states in India. The state ranked eighth among the states in India both in terms of share of Agriculture GDP (24.7 %). Small and marginal farmers account for 83% of land holdings and 46% of operated area. The state receives an average rainfall of 940 mm. Rain-fed Agriculture in Andhra Pradesh is to the extent of 6.4 million ha.

Organic Farming is gaining good momentum in Andhra Pradesh Organic Farming especially in the Rain-fed regions of the State as the DAC &FW, Government of India and Andhra Pradesh department of agriculture taken up the Certified Organic Farming program under 'National Program for Organic Production (NPOP)' program for Pulses and Paddy crops since 2006 and PGS-India in 2015.

1- Rice : Rice is a major food crop and staple food of the State contributing about 77 per cent of the food grain production. Other important crops are jowar, bajra, maize, ragi, small millets, pulses, castor, tobacco, cotton and sugarcane.The following package of practices recommended for crops under organic cultivation :

Organic Production practices:

1.	**Field preparation:**	Field is ploughed for Soil Solarization in the month of May. Second ploughing and clod crushing is done before monsoon with wooden plough or tractor or power tiller drawn cultivator.Puddling is done by wooden plough or tractor or power tiller drawn puddler.
2.	**Manuring**	The field should be manured with FYM mixed with Trichoderma @ 0.1% and Neem cake @ 5 and 0.5 tonnes/ha, respectively before puddling. Similarly, 4.5 tonnes/ ha of *Glyricidia* green leaf and 4.2 tonnes/ha of rice straw can be incorporated into puddled field prior to transplanting.

3.	**Suitable varieties**	Delhi Bhoghalu a well known fine paddy local variety; Karthika Pisanalu; Chaowti pisanalu; Pedda kesari vadlu; Jake vadlu;Sona masoori; Kaatuponni; Manjalponni; Kandasaali; Kaivarai Samba; Vaadan Samba; Vaalan Samba and Vaasanai Seeraga Samba etc.
4.	**Method of Planting/ Sowing**	Based on the conditions these are cultivated either by direct sowing or by SRI method.
5.	**Cultural Practices**	
	i. Seed Treatment	1. Overnight Soaking of Seed in 0.1% solution of Common salt or plain water for priming of seeds and removal of chaff and light weighted seeds from seed lot. 2. Azospirillium + PSB+ Zinc Solubiliser biofertiliser @ 200g per kg seed just before sowing either in nursery or direct sowing or seedling root dip for 20-30 minutes in biofertiliser slurry 2 kg in 100 liter of water per ha.
	ii. Basal Application of Organic inputs	1. Vermicompost @3000Kg or FYM @ 5000 Kg mixed with 10% neem Cake and 0.1- 0.2%*Trichoderma*as soil application, before Sowing / transplantation. 2, In the low land paddy cultivation Azolla is seeded in the flooded fields @20 kg per hectare, immediately after transplanting.
	iii. Spacing	20 x 15 Cm (approx).
	iv. Top Dressing	1. After 30 days after transplanting\ sowing, give spray of fermented cow urine or vermi-wash @50 lit /ha and repeat the spray after 20-25 days. 2. Application of jeevamrut @50 lit/ ha can be given after 10-15 days of transplanting or at the time of first irrigation.
	v. Weeding	The critical growth stage for weeding is 20 days; 30 days (tillering stage) and 60 days (Panicle initiation stage) after transplanting. Weeding can be done by Cono- weeder hoeing or by manual hand weeding, depending the stage of crop.
6.	**Plant Protection Practices** **A. Major Insect pests**	
	i.Stem Borer	• Deep ploughing and collection of stubbles after harvesting ofrice. • Use of tolerant and resistantvarieties. • Clipping of Seedling leaf tips at upper 2-3 cm, before transplanting. • Crop rotation with ground nut, *Dolichos*bean, cucumber and red pumpkin. • Harvesting of rice close to the ground to reduce stubbles. • Use of pheromone traps @20Nos./ha. • Release of *Trichogramma* @ 50000/ha for 4 times. Conservation and preservation of frogs in the field
	ii.Brown Plant Hoppers (BPH), White Backed Plant Hoppers (WBPH) and Blue beetle	• Use of tolerant and resistantvarieties. • Intermittent draining out water from thefield • Adoption of proper spacing(20x15cm) • Formation of alley ways for every three meters for penetration of sunlight and proper aeration • Use of Dashparni ark @50 lit/ha repeat the spray, if needed.
	iii. Army Worm and leaf eating Caterpillars	• Deep summer ploughing of field to expose the hibernating stages ofpest.Keeping the bunds clean and free of weed in the beginning of theseason. • Digging the trench and flooding it with water for preventing migration of larvae from one field to anotherfields.

		• Field scouting during dry spell and atmaturity. • Erection of birdperches and conservation and preservation of frogs in the field.
	iv. Leaf Roller, Skipper and cutter worms	Release of egg parasitoids *Trichogramma chilonis* and *T. japonicum* after 15-30 days oftransplantation or 25-30 days after sowing or immediately after noticing moth activity in the field. The release rate is 1 lakh parasitoids/ha of both size (5cc ha-1). The release has to be carried out at weekly intervals. The trichocard have to be cut into small pieces (minimum 10 pieces) and released in main field, 6-8 releases is necessary to control the pest.
	B. Major Diseases **i. Sheath blight and sheath rot**	• Use of *Trichoderma* and*Pseudomonas fluroscence* bio-pesticides as soil treatment and foliar spray. • Soil application of neem cake
	ii. Bakanae disease / Foot rot	Use of *Trichoderma* and neem cake as soil application.
	iii. Blast Disease	• Soil application of *Trichoderma* and neem cake. • Spraying of *Pseudomonas fluroscence* @ 10 g / lit of water, repeat spray after one week 2-3 times,startingfrom maximum tillering to flowering stage.
	iv. Bacterial Leaf blight and Leaf Streak	• Adoption of proper space and resistant / tolerant varieties. • Drain out water from the field intermittently. • Spray fresh cow dung extract for the control of bacterial blight. Dissolve 20 g cow dung(deshi cow) in one litre of water; allow to settle and sieve. Use supernatant liquid.

Note: The package given may be updated with the development of new technologies and location specific information available.

2. Groundnut : Groundnut is an important commercial crop in rain fed areas which contributes about 40 percent to the total oilseeds production in the country. In Andhra Pradesh groundnut is grown in Anantapur, Kurnool, Chittoor, Cuddapah, Warangal, Nalgonda, Srikakulam, Visakhapatnam and Mahaboobnagar districts.

Organic Production practices:

1.	**Field preparation:**	Field is ploughed for Soil Solarization in the month of May. Three to four ploughing and clod crushing is done to obtain fine tilth, as it is very important thata well-drained, light, loose, friable soils are required for groundnut cultivation.
2.	**Manuring**	The field should be manured with about 3000 kg/ha of Vermicompostor 5000 Kg/ha of FYM; mixed with Trichoderma and Phosphate Solubilizig biofertiliser@ 0.1% and Neem cake @ 5 and 0.5 tonnes/ha, respectively before sowing.
3.	**Inter crop and Crop Rotations**	In Andhra Pradesh sorghum is grown next to groundnut. When groundnut is sown as an irrigated crop, during the months of November and December, gingelly, Bengal gram and cowpea can be grown on the bunds. After 45 days, when weeding is done, cotton can be planted and gypsum applied to the field.Within three months, the groundnut can be harvested along with the oil seeds and pulses. Cotton can be picked later. This practice reduces the costs of ploughing, formation of ridges and furrows, weeding and spraying. Moreover, farmers can take advantage of three harvests in a single season. Intercrop of Cowpea with groundnut attracts sucking pests, hence reduces the damage to the main groundnut crop. Groundnut is also grown in rotation with jowar, bajra and onion, chilies, garlic, ginger and turmeric. Rhizobial association with groundnut crop can fix nitrogen in the soil. Hence the residual nitrogen becomes available to the crop that is grown next to it.
4.	**Suitable varieties**	Girnar 1, ICGS 10 and ICGU 86590 are resistant to foliar diseases. The popular varieties include GPBD-4; JL 24,TAG-24, DH-86; JL 24, VR 1, VRI 2, VRI3, TMV2, TMV7, CO2 and BSR-1.
5.	**Crop Duration**	The duration of the crop is 90–105 days for bunch types and between 120–130 days for spreading and semi-spreading types.
6.	**Cultural Practices**	
	i. Seed Treatment	Seed treatment with Rhizobium biofertiliser @ 200g per kg seed just before sowing.
	ii. Basal Application of Organic inputs	1. Vermicompost @3000Kg or FYM @ 5000 Kg mixed with 10% neem Cake and 0.1- 0.2%Trichoderma as soil application, before Sowing / transplantation. 2.Soil application of PSB and KMB @0.1% as mixer with Compost or vermicompost is effective.
	iii. Preparation of Beds and maintaining Spacing	Raised beds of 10 -20 Square meters are formed keeping in mind the slope of land and type of soil. Raised beds with a width of 60cm and with a furrow of 15cm on either side may be formed and sowing taken on the raised bed. Ridges and furrows may be laid at 60cm spacing between ridges and sowing taken on both sides of the ridge. Generally, spacing of 30 cm between rows and 10 cm between plants is maintained
	Seed Rate	About 125-150 kg/ha of kernels are used in general, however seed rate can be increased by 15% in the case of bold seeded varieties.
	Sowing	Seeds are sown by dibbling method at 4 cm depth along with vermicompost 3 tons/ha.

	Mulching	Mulching with Rice husk @ 10 t/ha and rice straw @ 4 t/ha after establishment of seedlings in the beds. Mulching with organic materials increases the soil nutrients, maintains the optimum soil temperature, restricts the rate of evaporation from the soil surface, restricts the weed growth and prevents the soil erosion.
	iv. Earthening up	It is an important operation in groundnut accomplished during second weeding. Earthing up is to be done within 40-45 days after sowing as it helps for the penetration of pegs in the soil and also facilitates for increased pod development. Don't disturb the soil after 45th day of sowing as it will affect pod formation adversely.
	v. Top dressing and application of Gypsum	Spray vermiwash or jeevamrut or cow urine on 15-20 days after sowing and repeat spray after one week interval. If Soils are deficient in Calcium and Sulphur, apply gypsum @ 400 kg/ha by the side of the plants on the 40th to 45th day of sowing.
7.	**Irrigation**	Pegging, flowering and pod development phases are critical for irrigation during which period adequate soil moisture is essential. Spraying 0.5% Common Salt during flowering and pod development stages will aid to mitigate the ill effects of water stress. Sprinkler irrigation will save water to the tune of about 30%. Borderstrip irrigation is recommended in command areas in light textured soils. Composted coir pith increases moisture availability and better drainage in heavy textured soil.
8.	**Plant Protection Practices**	
	i. Aphids	Application of neem oil@5ml+ liquid soap@5ml per lit. of water as spray on affected plant parts.
	ii. Red Hairy caterpillars	• Dig out and destroy the pupae from the field bunds and shady spots prior to summer rains • Set up 3 to 4 light traps and bonfires immediately after receipt of rains, after sowing in the rainfed season to attract and kill the moths and also to know brood emergence • Collect and destroy gregarious, early instar larvae on lace-like leaves of intercrops such as redgram and cowpea • Collect and destroy egg masses in the cropped area. Avoid migration of larvae by digging a trench 30 cm deep and 25 cm wide with perpendicular sides around the infested fields. • Virus infected larvae can be diagnosed by their pinkish ventral surface, their head hanging downwards with white body contents oozing out through ruptured body wall in the late stage. Collect the dying larvae, keep in fresh potable water for a few days, grind the larvae and filter through several layers of fine cloth and collect filtrate (Crude virus suspension). Use virus suspension obtained from 750 medium sized larvae for spraying one hectare along with a sticker 250 ml or Triton in 350 l of water. Use potable water for mixing and spray in the evening hours.
	iii. Tobacco caterpillar	• Monitor the emergence of adult moths by setting up light and pheromone traps • Spray neem oil (2%) 20 lit /ha • Spray dashparni ark @50 lit/ha • Apply Nuclear Polyhedrosis Virus 3 x 1012 POBs/ha • Intercrop lab lab with groundnut 1:4 ratio • Grow castor as border or intercrop in groundnut fields to serve as indicator or trap crop

	iv. Groundnut bud borer	• Neem oil 3 per cent and leaf extract of Vitex negumdo (Nirgundi) 5 per cent are effective against this pest. • Spray dashparni ark @50 lit/ha • The parasitoids Brachymeria sp cause parasitism up to 24 per cent on larvae
	v. *Tikka* (leaf spot) and Rust	• Spray 10% Calotropis leaf extract. •
	vi. Late Leaf spot /*Phaeoisariopsis*Leaf spot	• Intercropping pearl millet or sorghum with groundnut (1 : 3) is useful in reducing the intensity of late leafspot. • Crop rotation with non-host crops preferably cereals. • Deep burying of crop residues in the soil, removal of volunteer groundnut plants are important measures in reducing the primary source of infection.
	vii.*Sclerotium* **Stem rot**	• Deep ploughing to bury surface litter, cultivation of groundnut in flat or slightly raised beds. • Seed treatment with *Trichoderma viride* @ 4 g/kg seed and soil application of *Trichoderma viride* @2.5 kg/ha, mixed with 50 kg FYM or in conjunction with organic amendments such as castor cake or neem cake or mustard cake @ 500 kg/ ha.
9.	**Harvesting**	• Observe the crop, considering its average duration. Drying and falling of older leaves and yellowing of the top leaves indicate maturity. • Pull out a few plants at random and shell the pods. If the inner shell is brownish black and not white, then the crop has matured. • Irrigate prior to harvest, if the soil is dry, as this will facilitate easy harvesting. If there is enough moisture in the soil, there is no need for irrigation for harvesting. • If water is not available for irrigating the field prior to harvest, work a mould board plough or work a country plough, so that the plants are uprooted. Engage labour to search pods left out in the soil, if necessary. • Dry the pods in the sun for 4 or 5 days. Repeat drying for 2 or 3 more days after an interval of 2 or 3 days to ensure complete drying. When temperature is very high, avoid direct sun drying. Collect the pods in gunnies and store on the ground over a layer of sand to avoid any moisture coming in contact with dry pods.

Note: The package given may be updated with the development of new technologies and location specific information available.

3. Cotton :

Cotton production has a history that goes back to thousands of years and it is India's most important export crop and provides employment directly or indirectly to 60 million people. Cotton varieties *Gossypium arboreum, G. herbaceum* and *G. barbadense* cotton species are cultivated in Andhra Pradesh and Telangana including Karnataka, Tamil Nadu States.

Organic Production practices:

<table>
<tr><td>1.</td><td>Field preparation:</td><td colspan="2">One to two deep ploughings once in three years are necessary to control deep-rooted weeds and to destroy pest larvae or cocoons. After one or two showers, the soil should be worked with a harrow 2–3 times before the seeds are sown. Crop residues are one of the major sources of nutrients. The entire crop residue from the previous cotton-legume intercrop should be incorporated into the soil at the time of ploughing. About 20–30 quintals of well-decomposed FYM/compost or 15-20 quintals of on-farm produced vermicompost with 2 kg PSB, 100 kg rock phosphate and 200 kg neem leaf/seed manure can provide sufficient nutrition. About 500 kg bone meal can also be used along with the compost to improve the phosphorus content of the soil. Treatment of the crop residue with Trichoderma hasten in situ decomposition.</td></tr>
<tr><td>2</td><td>Suitable Varieties</td><td colspan="2">G. hirsutum–Kanchana; LK 861; L 603; L 604 with 155-180 days crop duration under irrigated conditions.While Krishna; LRA5166 and Narasimha are recommended for rainfed region with 145 and 180 days duration of crop.
G. arboretum-Arvinda; Mahanandi and Veena with 180 and 160 days crop under irrigated system.</td></tr>
<tr><td>3</td><td>Seed Rate</td><td colspan="2">3.5 – 4.0 kg/ha for hybrids and 15-18 kg /ha for desi varieties</td></tr>
<tr><td rowspan="8">4</td><td rowspan="8">Manuring</td><td colspan="2">Input requirement</td></tr>
<tr><td>a) Organic manures</td><td></td></tr>
<tr><td>i. Enriched compost</td><td>3000 kg/ha</td></tr>
<tr><td>ii. Vermicompost</td><td>2500 kg/ha</td></tr>
<tr><td>iii. Green manure</td><td>5000 kg/ha</td></tr>
<tr><td>iv. Neem cake</td><td>250 kg/ha</td></tr>
<tr><td>b) Azotobacter/ Azospirillum and PSB Bio-fertilizers</td><td>400 g each/ha</td></tr>
<tr><td>c). Biopesticide Trichoderma</td><td>40-50 g/ ha. dry spores</td></tr>
<tr><td colspan="2">Use ofJeevamrut@5% / Panchgavya @ 3% and cow urine @ 10 % spray at 60 and 75 DAS as a source of nutrient and</td></tr>
</table>

		growth promoter.
5	**Sowing**	Apply all the organic manures 15 days before sowing. Soak the seeds in 25% cow urine solution and air dried. Before sowing treat the seeds with biofertilizers. Sow the seeds at a spacing of 60cm x 30 cm during July-August by dibbling method.
6	**Inter crops**	Legumes need to be intercropped with cotton with a minimum coverage of 30%. Mixing their entire vegetative biomass as mulch maintains high soil fertility. Red gram or black gram or green gram or Soybean can be selected as legume intercrop. Two cotton seeds per hill between two chilli plants in a row in chilli intercropping system can also be sown. One row of maize/sorghum, 2 rows of red gram, 4 rows of cotton **or** 2 rows of cowpea/soybean, 4 rows of cotton or 2 rows of red gram and one row of maize/sorghum. Four rows of cotton, 2 rows of cowpea/soybean **or** 4 rows of cotton and one row of mixed plants of red gram, maize and sorghum can be planted.
7	**Cultural Operations**	Pruning of main and secondary shoot tips encourages growth of branches, resulting in development of many tertiary branches with more flowers and bolls. Proper pruning can increase productivity by 25–30%.
8	**Irrigation practices**	Although cotton is commonly flood-irrigated, irrigation by furrow or by alternate furrow method is more effective and conserves water. Irrigation requirements are low during the first 60–70 days, and highest during flowering and boll formation stage. The crop needs to be irrigated when there is 50–70% depletion of available soil moisture. In the sandy loam soils (of north India), the crop is irrigated 3–5 times. In red sandy loam soils, with low water retention capacity, 4–10 light irrigations may be needed. In black cotton soils 'protective irrigation' is provided every 20 days, if rains fail, especially during the boll development stage. Mulching of the soil surface with intercrop biomass 60 days after sowing reduces irrigation requirements by 40–60%. Mulching is very effective under purely rain-fed conditions.
9	**Weed Management**	Mulching of the field with a thick layer of crop residue immediately after sowing reduces weed growth. Inter cultivation at 25, 35 and 50 Days After Sowing (DAS) and hand weeding at 30 and 55 DAS is recommended.
10	**Crop Protection**	• Use marigold and bhendi as trap crops for management of bollworm and shootweevil. • Plant Maize as bordercrop

		• Use of pheromone traps @ 5/ha for monitoring of*H.armigera.* • Yellow sticky trap for management of whiteflies @ 10/acre. ▪ Botanical @ 5% spray at 30 and 60 DAS as a biopesticides for sucking pestmanagement. ▪ Release of trichocard @ 1 card/acre at weekly interval 8-10 times after squareformation. Two to three releases of egg parasitoid Trichogramma chilonis @1.5 lakh / ha during peak egg laying of Helicoverpa and other bollworms will help to reduce the bollworms infestation significantly. ▪ Neem seed kernel extract @ 5% spray at 90 and 105 DAS as a bio-pesticide for bollworm management. ▪ Use of Trichoderma as seed treatment can effectively control the incidence of root rot and Fusarium wilt. ▪ Use of neem leaf/seed manure (10 q/ha) has also been found to be effective in the control of soil borne pathogens. ▪ For the control of rust and root rot, fermented (sour) buttermilk (5 lit.) in lime water (100 litres) per ha may be sprayed. ▪ Foliar spray of Trichoderma viride powder (25 g), milk (50 ml) and water (10 litres) can reduce the incidence of brown leaf patches. ▪ Crush 5 kg lantana leaves in 5 lit. of water and 10 lit. of cow urine and ferment for 4 days. Dilute thereafter with 60 lit.water and spray on 1 ha to control fungal and viral diseases. The solution also repels white flies.
11	**Harvesting & Yield**	In organic farming, the yield of cotton varies from 8–10 q/ha in rain-fed areas to 20–25 q/ha under irrigated conditions. Besides, the farmer obtains about 50 to 250 kg of intercrop legume crop or benefits of other intercrops.

Note: The package given may be updated with the development of new technologies and location specific information available.

4. MAIZE (*Zea mays*)

Maize can be grown throughout the year at altitude ranging from sea level to about 300 m. Maize grows best in areas with rainfall of 600-900 mm. It requires fertile, well-drained soil with a pH ranging from 5.5-8.0, but pH 6.0-7.0 is optimum.

Organic Production practices:

<table>
<tr><td>1.</td><td>Field preparation:</td><td colspan="2">Prepare land by ploughing and harrowing three times and prepare ridges and furrows. Apply green leaf manures and FYM/compost mixed with Trichoderma@0.1% about15 days before sowing and in corporate into the soil at the time of final ploughing.</td></tr>
<tr><td>2</td><td>Suitable Varieties</td><td colspan="2">Composite varieties: Amber; Amar, Azad Kamal,Amber; Ganga safed; Kissan Composite, Jawahar Makka 3,5; Pratap Makka 3, G M 2,4 & 6; Jawahar Makka 8, Jawahar composite 12, Chandramani, Pratap Makka 3 Vijay, Vikram, Sona and local composite varieties.</td></tr>
<tr><td>3</td><td>Crop duration</td><td colspan="2">Crop duration 110-120 days. As a rainfed crop, maize is grown in June-July or August-September. The irrigated crop is grown in the months of January-February.</td></tr>
<tr><td>4</td><td>Seed Rate</td><td colspan="2">15-20 kg/ha depending on the variety</td></tr>
<tr><td>5</td><td>Seed Treatment</td><td colspan="2">Seed treatment with Azospirillium/ Azotobacter @200g per kg seed</td></tr>
<tr><td rowspan="9">6.</td><td rowspan="9">Manuring</td><td colspan="2">Input Requirement</td></tr>
<tr><td>a. Enriched compost</td><td>4000 kg/ha</td></tr>
<tr><td>b. Vermicompost</td><td>3500 kf/ha</td></tr>
<tr><td>c. Green leaf manure</td><td>6000-7000 kg/ha</td></tr>
<tr><td>d). Neem cake</td><td>2250 kg/ha</td></tr>
<tr><td>e) Bio-fertilizers</td><td></td></tr>
<tr><td>Azospirillum/ Azotobacter ; PSB and Zinc Solubiliser biofertiliser</td><td>1.5 -2.0 kg/ha each</td></tr>
<tr><td>f). Biopesticide Trichoderma</td><td>40-50 g/ ha. dry spores</td></tr>
<tr><td colspan="2">Jeevamrut@5% / Panchagavvya @ 3% and cow urine @ 10 % spray at 30 and 45 DAS as a source of nutrient and growth promoter.</td></tr>
<tr><td>7.</td><td>Sowing</td><td colspan="2">Apply half of the vermicompost at the time of sowing to seed row.Soak the seeds in water for overnight, dry and treat them with biofertilizers. Sowingis done by dibbling or row sowing</td></tr>
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		by seed drill at a spacing of 60 cm x 30 cm approx. Apply remaining half dose of the vermicompost at 30 days after sowing (DAS) and ensure sufficient moisture at the time of application.
8.	**Weeding**	Hand hoeing and weeding on the 21st and 45th day after sowing (DAS).Intercultivation at 20 and 40DAS two and hand weeding at 25 and 45 DAS will manage weedsefficiently.
9.	**Irrigation**	Irrigate the crop on the day of sowing and on third day. Subsequent irrigations may be given at 10-15 days intervals.
10.	**Plant Protection**	• Plant NB 21 grass on the bunds as a trap crop for management of stem borer ofmaize. • Release of *Trichogram* **@** 50000/ha (1 card/ha) at weekly interval 3 to 4 times to control stemborer. • *N. rileyi* @ 1g/l spray or HaNPV 250LE/ha for management of cobborer • Neem seed kernel extract @ 5% or Botanicals @ 10% spray at 45 and 60 DAS as a bio-pesticide to control aphids and stemborer. • To control armyworm spray Dashparni ark ; NSKE 5% and *Nomuraea rileyi* @ 1 g /l ofwater.
11.	**Yield**	30 - 35 q/ha grain yield and 5.0 tonne of fodder yield.

Note: The package given may be updated with the development of new technologies and location specific information available.

5. SORGHUM (*Sorghum bicolor*)

India contributes about 16% of the world's sorghum production. It is the fourth most important cereal crop in the country and also contributing green fodder, feed and biofuel. Sorghum is an important cereal crop of Andhra Pradesh and Telangana. Sorghum is a plant of hot and warm localities. The optimum temperature for growth is 30°C and it needs about 250-400 mm rainfall. Excess moisture and prolonged drought are harmful. It is fairly tolerant to alkalinity and salinity. Sorghum is grown both during *kharif* and *rabi* seasons were as quality is good from rabi crop. The yield depend upon soil fertility, rainfall varieties, pest and diseases.

Organic Production practices:

<table>
<tr><td>1.</td><td>Field preparation:</td><td colspan="2">Prepare land by ploughing and harrowing and apply green leaf manures and FYM/compost mixed with Trichoderma @0.1% about 15 days before sowing and in corporate into the soil at the time of final ploughing.</td></tr>
<tr><td>2.</td><td>Suitable Varieties</td><td colspan="2">Hybrid CSH6 with 95-100 days crop duration is suitable for low rainfall tracts of kharif and late kharif season in AP. Ideally suited for intercropping and rationing.
Besides other varieties like CSV 1; CSV 2; CSV 3; CSV 4; CSV 6; CSV 10; CSV 17 and CSV 20 are other promising varieties are promising with95-120 days crop duration and substantial yields in terms of fod and fodder,</td></tr>
<tr><td>3.</td><td>Crop duration</td><td colspan="2">Ranging from 95-120 days depending up on varieties</td></tr>
<tr><td>4.</td><td>Seed Rate</td><td colspan="2">10.0-15.0 kg /ha depending on variety or hybrid.</td></tr>
<tr><td>5.</td><td>Seed Treatment</td><td colspan="2">Azospirillium + PSB biofertilisers@ 200 -250 g / ha.</td></tr>
<tr><td rowspan="7">6.</td><td rowspan="7">Manuring</td><td colspan="2">Input Requirement</td></tr>
<tr><td>a. Enriched compost</td><td>2000 kg/ha</td></tr>
<tr><td>b. Vermicompost</td><td>1500 kg/ha</td></tr>
<tr><td>c. Green leaf manure</td><td>3000 kg/ha</td></tr>
<tr><td>d. Neem cake</td><td>250 kg/ha</td></tr>
<tr><td>e. Bio-fertilizers Azospirillum/ Azotobacter and PSB</td><td>1.5 -2.0 kg/ha each</td></tr>
<tr><td>f). Biopesticide Trichoderma</td><td>40-50 g/ ha. dry spores</td></tr>
</table>

7.	**Sowing**	Apply organic manures mainly FYM/compost and green leaf manures 15 days before sowing. Before sowing soak the seeds in cow urine @ 25% solution, improves the germination and induce drought hardiness. The soaked seeds are treated with biofertilizers. Sow the seeds in 45 cm row spacing 15 cm apart to a depth of 5-7 cm.
8.	**Foliar Spray**	Foliar spray of Jeevamrut; cow urine @ 10% and Panchgavyya @ 3% spray at 30 and 45 DAS as a source of nutrients and growth promoters improve the yield and help to overcome the nitrogen deficiency
9.	**Weed Management**	Thinning, weeding and hoeing may be done on the 20th day after sowing (DAS). at 25, 50 and 60 DAS and hand weeding at 30 DAS to manage the weeds.
10.	**Irrigation**	Given on 10th day of sowing and thereafter 10 days interval under irrigated conditions of cultivation.
11.	**Plant Protection**	• Spray dashparni ark at milky stages for the control of earhead bugs. • Spray *Pseudomonas fluorencence* and *Trichoderma* on 30 day after germination and repeat spray after 15 days interval to control foliar diseases. • Neem seed kernel extract @ 5% spray at 25 DAS help to manage shoot fly and suckingpests. • To manage aphids foliar application of *Verticillium lecanii* @ 2 g or Botanical mixture @ 10% spray or NSKE5% as foliarspray.
12.	**Yield**	3-4 q/ha grain yield and 8-12 tonn/ha fodder yield can be obtained.

Note: The package given may be updated with the development of new technologies and location specific information available.

Reference:-

1. OrganicPaddy Cultivation. Chandra Sekhar G., Ramanjaneyulu G.V., Hussain Z, and RajashekarG. 2015.Centre for Sustainable Agriculture, Hyderabad. 56 Pp.
2. Organic farmers and Farms in Andhra Pradesh 2018. Prajasaktinagar, Vijayawada - 520 010, Andhra Pradesh.Centre for Sustainable Agriculture, Hyderabad. 11 Pp.
3. Network Project on Organic Farming, Project Directorate for Farming Systems Research, (Indian Council of Agricultural Research), Modipuram, Meerut-250 110, Uttar Pradesh: 14 pp.
4. ICAR Network Project on Organic Farming Dharwad Centre. Institute of Organic Farming. Directorate of Research University of Agricultural Sciences Dharwad-580005, Karnataka: 10.pp

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