

Research Recommendations released during 2015 - 2016

(Approved by Joint Agresco - 16)

I. Crop Improvement

Sr. No.	Crop	Variety Hybrid	Important Features
1	Sunflower	Hybrid PDKVSH-952	<ul style="list-style-type: none"> ✓ Higher Seed Yield (15-18.0q/ha). ✓ Oil Content-36.03% ✓ Duration 90 days ✓ Moderately resistant to powdery mildew
2	Kharif Sorghum	AKSV-181 (PDKV KALYANI)	<ul style="list-style-type: none"> ✓ Higher grain yield (35 q/ha). ✓ Higher fodder yield (153 q/ha). ✓ Duration-117 days ✓ Non lodging and shattering ✓ Resistant to wilting

II. New Farm Implement/ Machinery

Sr. No.	Name of farm implement/ Machinery	Important Features
1	PDKV Turmeric Washing Machine	<ul style="list-style-type: none"> ✓ Raw turmeric washing capacity-2.25 q/ha ✓ Washing efficiency-96.19% ✓ Portable and safe to handle ✓ Easy to operate for unskilled labour
2	PDKV hand operated custard apple deseeding Machine	<ul style="list-style-type: none"> ✓ Machine Capacity- 30 kg/hr. ✓ Pulp separation efficiency 95.9% ✓ Pulp recovery-98% ✓ Suitable for small entrepreneurs, farmers

III. Production technology (Field Crops)

1. For obtaining, higher grain yield with maximum economic returns from wheat variety PDKV-Sardar , sowing during 26 Nov to 2 Dec is recommended in Vidarbha region.

2. In organic farming, application of 100% RDN through vermicompost @ 2.5t/ha for soybean and 7.5t/ha for wheat is recommended for increasing the system productivity, economic returns and improving soil fertility status in soybean - wheat cropping sequence under irrigated condition.
3. It is recommended to use soybean straw compost (5 t/ha) as an alternative source to FYM for maximizing the nutrient availability in soil, yield and economic returns of organic cotton production system.
4. Foliar application of 1% urea at 50% flowering stage along with RDF is recommended for more yield and higher economic return in rainfed mustard.
5. Application of FYM 10t/ha or Castor cake @500Kg/ha or Green manuring of sunhemp 40 days after sowing in Cotton + seed treatment of Azotobactor + PSB @25g and trichoderma 4 g /kg seed is recommended for sustainable production of organic *Arboreum* cotton.
6. In conservation Agriculture, bio-mulching of sunhemp at 45 DAS in Pigeon pea inter cropping (1:2) in first year followed by rotation system of Bt cotton under minimum tillage (1 Harrowing + 1 Hoeing + Herbicide) with 100 % RDF (60:30:30 NPK kg/ha) is recommended for higher returns from Bt cotton and enhancing soil health.
7. In Sorghum-chickpea cropping sequence application of 100 % RDF (80:40:40NPK kg/ha) out of which 75% RDN through inorganic fertilizer +25% RDN through FYM(2.5 ton) + seed treatment with PSB + Azospirillum to kharif sorghum followed by rabi chickpea without recommended dose of fertilizer is recommended for getting maximum yield, net return and enhancing soil fertility.
8. In sulphur deficit soils application of 30 kg S ha⁻¹ through gypsum(250 kg) or bentonite sulphur(35 kg) along with RDF (60:30:30 kg N:P:K/ha) is recommended to increase the sustainable productivity and oil content of Bt cotton under rainfed condition.

Rainfed Crops

9. In rainfed condition for sorghum crop, low tillage (one hoeing followed by one hand weeding) with 20 kg nitrogen through inorganic fertilizer + 20 kg N through FYM (3.8 t ha⁻¹), 40 kg P₂O₅ and 40 kg K₂O as basal dose and 20kg nitrogen through inorganic fertilizer + 20 kg N through glyricidia (3t ha⁻¹) at 30 DAS is recommended for higher water use efficiency, enhanced soil fertility and higher grain yield.

10. In medium depth soils of Vidarbha under rainfed condition, the cotton genotypes AKH 081, Suraj and NH 615 are recommended for high density planting on BBF at 60 x 10cm spacing (1.66 lakh population/ ha) with 125% RDF(75:37.5: 37.5 NPK + 2.5 Zn Kgha-1) with foliar spray of 1% urea and 1% magnesium sulphate at boll development stage for higher seed cotton yield economic returns and rain water use efficiency.
11. It is recommended to apply irrigation at 0.8 Etc through drip with polythene mulch (30mm) to achieve higher seed cotton yield, monetary return and B:C ratio in Bt cotton.

Weed Management

12. Pre emergence application of Pendimethalin 38.7 CS PE @ 1.25 kg a.i./ha *fb* hoeing at 30 DAS and hand weeding at 45DAS is recommended for effective management of weeds under high density planting of cotton for getting higher economic returns.
13. Through Post-emergence weeds management spraying of herbicide Quizalofop ethyl 5 EC 100 g a.i./ha or Imazethapyr 10 % SL 100 g a.i./ha in 500 litre water at 25- 30 days after sowing for effective controlling weeds and obtaining higher pods yields and economic return in Kharif groundnut is recommended.

Soil Science & Agril Chemistry

14. It is recommended to adopt conservation tillage (one harrowing and two weeding) and 50 % N through gliricidia green leaf manuring (3.5 t ha⁻¹) and compensation of RDF through chemical fertilizers (30:27:8 kg NPK ha⁻¹) as a alternative to FYM (50 % N) for sustaining productivity of cotton, monetary returns and improvement in soil health of Vertisol under rainfed situations.

Plant Protection

A) Entomology

15. Inter cropping of linseed + Chickpea at 4:2 row proportion is recommended for more linseed equivalent yield (LEY) and higher economic returns by minimizing budfly infestation.

B) Plant Pathology

16. Pre-sowing treatment of Rhizobium isolates, AKCR-1 (25g/kg seed) is recommended for yield of chickpea in Vidarbha region.
17. For effective management of root rot of soybean and higher benefit cost ratio seed treatment of Carboxin 37.5% + Thiram 37.5% (combi product) @ 2g/kg seed prior to sowing is recommended.

Horticulture

(A) Fruits

18. For commercial propagation of guava through softwood grafting, rootstock NGR-04 and Sardar are recommended for better grafting success.
19. The softwood grafting on one year age of rootstock of defoliated scion before 6 days in the month of December is recommended for maximum success in Jackfruit under Vidarbha condition.
20. The nutrient dose of - 75% RDF + 1.5 Kg Vermicompost + Azotobactor 50g + PSB 50g per plant is recommended for obtaining higher yield and more net return of banana.
21. High density planting at 6mX3m on raised bed (Indo-Israel Citrus Production Technology) is recommended for obtaining better growth, yield and quality fruits of Nagpur Mandarin.
22. Pruning during third week of December at 10ft height is recommended for obtaining higher and better quality yield of *Ambia bahar* in Nagpur mandarin under high density planting at 6m x 3m.
23. Application of potassium @ 600 g per plant through Muriate of potash along with recommended N(1200 g) and P (400 g) is recommended for obtaining maximum fruit yield with best quality Nagpur mandarin fruits as well as getting maximum returns from Nagpur mandarin orchard.
24. The organic nutrition management of mandarin through application of 75%Vermicompost (on N- equivalent basis of RDF- i.e. 60 kg/ plant/ year) + *Trichoderma harzianum* (40 ml/plant) + Azadirachtin (1% at 4 ml/liter as spray)+ *Pseudomonas fluorescens* (30-40 ml/plant) is recommended for maximum

yield with quality.

25. Drip irrigation at 90 % ER 80 % RDF (960: 320: 320g NPK/ plant) through fertigation is recommended for higher yield and quality of Nagpur mandarin.
26. The aonla varieties, Krishna and Chaikaya having less fibre content are recommended for the preparation of best quality candy with maximum nutritional qualities and consumer acceptance.
27. The bael syrup prepared by adding 30 per cent bael pulp can be stored in good condition upto 150 days at cold storage and upto 120 days under ambient storage condition is recommended

Vegetable

28. The onion variety Bhima Raj is recommended for late *kharif* season (*Rangda*) with fertilizer dose of 150:50:50:30 kg/ha NPK & sulphur for getting maximum yield under *Vidarbha* condition.
29. An application of Azotobacter @ 5 kg ha⁻¹ + 75 kg N + 50 kg P₂O₅ + 50 Kg K₂O is recommended to obtain higher yield with good quality onion bulbs with minimum storage losses.
30. In Sulphur deficient soils, an application of Sulphur @ 30 kg ha⁻¹ through bentonite along with the recommended dose of fertilizer(100:50:50 NPK Kg/ha) is recommended for getting highest garlic bulb yield and economic return with good storage.
31. The coriander variety Pant Haritma, an early duration variety with more fresh leaf yield is recommended for cultivation for higher production and economic returns

Inter Cropping

32. It is recommended that, the intercropping of Ajwain + Cabbage (1:1) or Ajwain + Radish (1:1) is recommended for getting maximum economic returns and LER.

Flowers

33. The spacing 30X25cm spacing is recommended for gladiolus planting to get quality flowers spike, more no. of corms and net monetary returns.

Forestry

- 34 .For production of maximum new and total bamboo and higher monetary returns, bamboo plantation raised on shallow to medium deep soil with 1.2 to 1.5% slop, it is recommended to apply 30% felling intensity with water conservation treatment of circular trench with 1.75 m diameter,25 cm depth and 60 cm width around the bamboo clumps.
35. For sustainable management of ecotourism in forest areas of Akola district 08 criteria and 60 indicators are recommended, it will help to improve the socio-economic and cultural status of the beneficiaries and helps to improve ecological condition of the ecotourism area.
- Criteria 1- Increased in the extent of forest tree cover and ecotourism area (5)**
- Indicator 1** - Area and type of forest cover
- Indicator 2** - Trees cover outside forest area (ToF)
- Indicator 3** - Area of dense and open forest
- Indicator 4** - Forest area diverted for non-forestry purpose
- Indicator 5** - Extent of community managed forest areas
- Criteria 2-Maintenance, conservation and enhancement of biodiversity (6)**
- Indicator 1** - Area of protected ecosystem
- Indicator 2** - Area of fragmented ecosystem
- Indicator 3** - Number of rare, endangered, threatened and endemic species.
- Indicator 4** - Level of richness and bio- diversity in selected areas
- Indicator 5** - Availability of medicinal and aromatic plants in selected areas.
- Indicator 6** - Status of non – destructive harvest of Non Timber Forest Produce (NTFP)
- Criteria 3-Maintenance and enhancement of healthy Ecosystem (9)**
- Indicator 1**- Increased number of wildlife animal citing
- Indicator 2**- Availability of water sources in forests ; natural stream, spring, nala etc.
- Indicator 3**- Number of scared groves around
- Indicator 4** - Occurrence of weeds in the area
- Indicator 5**- Number of rainy days and amount of precipitation
- Indicator 6**- Availability of Indigenous species
- Indicator 7**- Citing of avifauna
- Indicator 8**- Availability of endangered / threatened plants
- Indicator 9**- Level of soil erosion

Criteria 4-Conservation and maintenance of social, cultural and spiritual heritage (6)

Indicator 1- Popularity of local food, traditional dresses and language

Indicator 2- Involvement of local people/ local cultural committees at decision making level.

Indicator 3- Number and type of activities associated with temple and religious institutions

Indicator 4- Number of ethnic festival and dance organized at community level.

Indicator 5- Promotion of local handicraft.

Indicator 6- Respectability of local community to visiting tourist.

Criteria 5 -Maintenance and enhancement of livelihood support system and empowerment of the local people (6)

Indicator 1- No. of Ecotourism services providers

Indicator 2- No. of men and women entrepreneur

Indicator 3- No. of people involved in Non Timber Forest Produce (NTFP) based livelihood

Indicator 4- Income from seasonal arrangement tourism work

Indicator 5- Equity in benefit sharing

Indicator 6- No. of people brought above poverty line due to ecotourism

Criteria 6-Tourist Satisfaction (7)

Indicator 1- No. of tourist visits per year

Indicator 2- Tourist safety

Indicator 3- Feedback from tourists

Indicator 4- No. of complaints by tourist at tourism development, forest check posts and police outpost

Indicator 5- No. of different tourist product

Indicator 6- Quality of product

Indicator 7- No. of tourist reporting

Criteria 7-Maintenance and enhancement of carrying capacity and code of conduct (6)

Indicator 1- Availability of carrying capacity norms developed by local community

Indicator 2- Availability of carrying capacity norms in terms of ecological, financial, social, economic and visitors carrying capacity

Indicator 3- Limits of acceptable change to critical tourism sites

Indicator 4- Deterioration of floral and faunal habitat

Indicator 5- Compliance of carrying capacity norms by tourism permit authority

Indicator 6- Compliance of carrying capacity norms by the tour operators

Criteria 8-Adequacy of policy, legal and institutional framework (15)

Indicator 1- Existing policy and legal framework

Indicator 2- Enabling conditions for participation of community, NGO's, civil society

Indicator 3- Level of investment in research and development

Indicator 4- Human resource capacity building efforts

Indicator 5- Forest resource accounting

Indicator 6- Monitoring and evaluation mechanism

Indicator 7- Status of information dissemination and utilization

Indicator 8- Availability of Ecotourism policy

Indicator 9- Availability of tourism infrastructure

Indicator 10- Inter and intra departmental coordination

Indicator 11- Co-operation from the government for development of ecotourism

Indicator 12- Amount of external and local funding generated for promoting ecotourism

Indicator 13- Generation of local level funds for conservation and maintenance activities

Indicator 14- No. of activities/ schemes for ecotourism

Indicator 15- No. of tourism and conservation projects

36. For sustainable management of Agroforestry systems in Akola district, 8 criteria and 40 indicators are recommended which will help to improve the socio-economic and cultural status of beneficiaries and help to improve the ecological conditions of agroforestry systems of the area.

Criteria 1 - Increased in the extent of forest resources outside forests

Indicator 1- Extent of Agroforestry plantation area under govt. land, private land, community land

Indicator 2- Change in tree cover outside forest area

Criteria 2 - Maintenance, conservation and enhancement of area under Agroforestry component and biodiversity

Indicator 1- Species diversity in Agroforestry systems; flora and fauna

Indicator 2- Number of rare, endangered, threatened and endemic species

Indicator 3- Extent of indigenous and exotic species in Agroforestry systems

Indicator 4- Extent of mixed and multipurpose plant species in Agroforestry systems

Indicator 5- Change in ecological status of landscape before and after agroforestry plantation

Criteria 3 - Maintenance and enhancement of healthy Ecosystem and vitality under

Agroforestry systems

Indicator 1- Quality of the various component under Agroforestry systems (tree as well agricultural crops)

Indicator 2- Survival of the plant species under Agroforestry systems

Indicator 3- Regeneration status of the tree species in Agroforestry systems

Indicator 4- Extent of damage to different component of Agroforestry systems causes due to natural, man-made, wild and domestic animals

Indicator 5- Protection of different components of Agroforestry systems from pest, diseases, fire and invasive weeds

Indicator 6- Extent of use of approved best quality planting material like seeds, cutting etc.

Criteria 4 - Maintenance and enhancement of social, cultural and economic benefits from Agroforestry systems

Indicator 1- Direct and indirect benefits to local people from management of Agroforestry systems

Indicator 2- Local and other stake holders involvement in management of Agroforestry systems

Indicator 3- Utilization of Indigenous knowledge

Criteria 5 - Conservation and maintenance of soil and water resource conservation through Agroforestry systems

Indicator 1- Contribution of Agroforestry systems towards treatment of denuded and degraded land

Indicator 2- Area treated under soil and water conservation

Indicator 3- Water regime and quality inside vicinity of Agroforestry systems

Indicator 4- Water level in the wells in the vicinity of Agroforestry system area

Criteria 6 - Maintenance and enhancement of productivity of Agroforestry systems

Indicator 1- Extent of utilization of investment made for Agroforestry systems

Indicator 2- Growing stock of the Agroforestry systems

Indicator 3- Rotation period and harvesting of the tree component under Agroforestry systems

Indicator 4- Availability of Non Timber Forest produce (NTFP) from the Agroforestry systems other than timber products

Criteria 7 - Maintenance and enhancement of productivity, functions and utilization of Agroforestry products

Indicator 1- Recorded removal of agriculture crops

Indicator 2- Recorded removal of pastures

Indicator 3- Recorded removal of timber

Indicator 4- Record removal of fuel wood

Indicator 5- Recorded removal of locally important Non Timber Forest produce (NTFP) (fodder, gum, fruits, fibers, etc.

Indicator 6- Direct employment through different operations under Agroforestry systems management

Indicator 7- Utilization of different products in Agroforestry systems; subsistence, intermediate and commercial

Indicator 8- Quality and value of different products from Management of Agroforestry systems

Indicator 9- Extent of value addition in different products of Agroforestry system

Indicator 10- Impact of Management of Agroforestry systems on local economy and reduce dependency on natural forest resources

Criteria 8 - Adequacy of policy, legal and institutional framework for establishment of Agroforestry systems and their management on private land and public land

Indicator 1- Existence of policy and legal provision for Agroforestry systems and their management

Indicator 2- Existence of guiding principle to cover appropriate land use categories

Indicator 3- Existence of management plans and guidelines for Agroforestry systems

Indicator 4- Implementation of management plans prescriptions and guidelines

Indicator 5- Availability of financial resources

Indicator 6- Availability of trained human resources in Agroforestry

Agril.Engineering

Soil water conservation

37. In medium to deep black soil for higher *in-situ* soil, water, nutrients conservation and improving physical properties of the soil (eg. Bulk density, soil resistance etc.), crop growth, water and energy use efficiency and yield in soybean and

cotton crop, it is recommended to adopt sub-soiling at 90 cm H.I. up to 55 to 60 cm depth with 2 tyne and 1 blade harrow before sowing.

Agril.Process Engg.

38. It is recommended to use Burr mill (1 HP Motor) for Chironji nut decortication by keeping 12 mm clearance between pair of disc.
39. It is recommended that custard apple pulp separated by PDKV de-seeding machine should be stored at -18 to -20° C temperature in deep freeze or cold storage treated with 0.1 percent potassium metabisulphite for six months storage period.

UCES and EE

40. It is recommended to use portable PDKV mini solar dryer (1.6 x 1.0 x 0.9 m) of capacity 10 kg for drying of agricultural produce with quality at domestic level
41. It is recommended to use PDKV natural convection solar dryer having 2.62 sq m solar collector and 35 kg capacity for drying of agricultural produce
42. Highly thermo efficient (31.34 %) and less emission of carbon monoxide natural draft cotton stalks based PDKV biomass cook stove is recommended for cooking in rural households

Animal Husbandry and Dairy

43. It is recommended that blending of 4 % ginger juice and 0.4 % turmeric powder as a natural flavor and coloring agent produce good quality value added herbal softy ice cream
44. It is recommended that, blending of 20 % unripe cooked banana pulp in cow milk chakka produced good quality value added banana shrikhand
45. Feeding of 5% dry azolla in the diet of Giriraja poultry birds is recommended for better body weight and maximum economic gain under intensive rearing

Biotechnology

46. It is recommended to use BTC-CTV-1, BTC-CTV-2, BTC-CTV-3, BTC-CTV-4 set of primer for specific identification of CTV in citrus orchard.

Social Science

(A)Extension Education

47. In Amravati revenue division of Vidarbha 96.67 per cent selected cotton and soybean farmers and 62.50 per cent selected extension workers were found unaware about the label claims of pesticides. The results regarding the adoption status of the pesticides as per the label claims (Herbicides, insecticides and fungicides) revealed that large number of the selected farmers using pesticides not approved by Central Insecticides Board and Registration Committee (i.e. without label claims).

Hence it is recommended that State Department of Agriculture and KVKs should organize regular trainings/workshops/ for the extension functionaries and farmers. Distribute printed materials and give wide publicity through Mass Media about crop specific label claims of pesticides for creating awareness about the label claims of pesticides

48. It is therefore, recommended that, State Department of Agriculture and ATMA regular Training Programme and Field School for the K. Limegrowers to increase their knowledge and adoption level about recommended technologies of the University with the technical guidance of Agriculture University Scientists and Subject Matter Specialist of KVK .
49. Women Farmers from Gadchiroli and Wardha districts expressed the need for a training on rearing of silkworm. It is recommended to to organize residential training at the institute to acquire skill for silkworm rearing

B) Agriculture Economics and Statistics

50. In order to minimise the price risk and to protect the price security of farming community and also to stabilise the acreage under Chickpea and Blackgram of Maharashtra state which are the volatile commodities in terms of market prices, it is recommended that long term procurement policy should be adopted to maintain price stability throughout the year at least for major markets of the state.
51. Considering the factors of market distance, per quintal marketing cost including transportation , producer share in consumers rupees and marketing efficiency of selected market for ajwain, it is recommended that, farmers should sale their produce to Neemuch market (Madhyapradesh), Unjha market (Gujrat) and Bhilwara market (Rajasthan) as compare to local market to gain better market margin to the farmer

52. Maize appeared to be one of the important emerging crop in the Buldhana district and it become additional crop in the cropping pattern of the district. Therefore, it is recommended that to allocate more area invariably under the cultivation of maize crop by providing high yielding varieties and introducing improved technology through university
53. Decline in area and yield of Soybean in Nagpur district was mainly due to low remunerative price in the market, attack of insect and pests and changes in climate were the major reasons. It is recommended that, to overcome these problems government should provide good remunerative prices to the farmers and awareness about the insect and pest management through the concern government agencies.