Directorate of Research
Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola
(Research recommendations approved during the Joint Agresco-2025)

Research Recommendations 2024-25

1) Varieties released

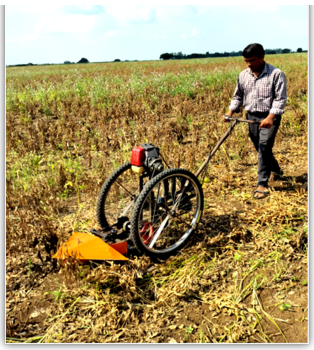
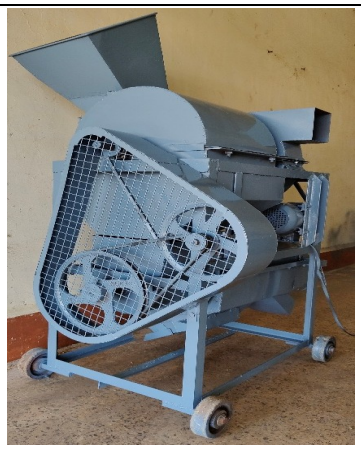
S.N.	Released Variety	Salient features	Photograph of variety
1.	Sorghum (Rabi): PDKV Shashvat (AKASV 461 R)	• Grain yield: 31.8 q/ha. • Fodder yield: 78.66 q/ha. • Good Roti quality and Organoleptic quality. • Moderately resistant to shoot fly and stem borer. • Moderately resistant to charcoal rot, rust and leaf blight diseases. • Released for Rabi rainfed areas of Maharashtra.	
2.	Finger millet PDKV Aadishree (BFM 8-E)	• Grain yield: 31.8 q/ha. • Early maturing variety (100-105 days). • It is moderately resistant to leaf blast and brown spot disease • Released in Maharashtra for kharif season.	 

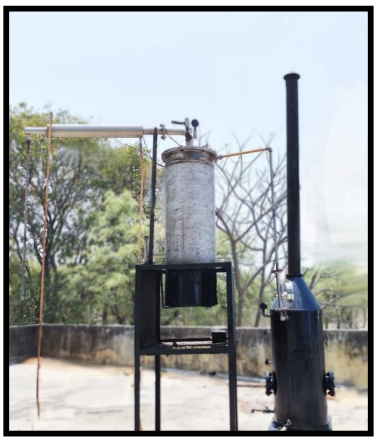
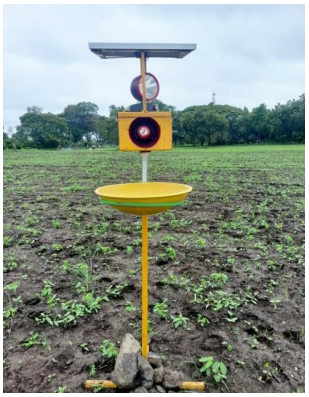
3.	Mung: PDKV-Varsha (TAKM-141) (Kharif)	• Yield: 1076 kg/ha. • Top bearing for easy pod picking • Medium Bold seed type with non-shattering pods. Resistant to yellow mosaic virus disease.	  
4.	Mung (Zaid): PDKV-Phalguni (TAKSM-140)	• Yield: 9.09 kg/ha. • Suitable for summer cultivation in Maharashtra. • Matures in 70 days with synchronous maturity. • Attractive and shiny bold seeds. • 5.62 g per 100 seed weight. • Resistant to yellow mosaic virus disease.	 
5.	Chickpea: PDKV Kabuli-5 (AKGK1801)	• Yield: 2067 kg/ha. • Early and synchronous maturity (104 days). • Tall and erect in growth habit and suitable for mechanical • harvesting. • Bold seeded (45 g per 100 seed wt.) • Resistant to Fusarium wilt.	

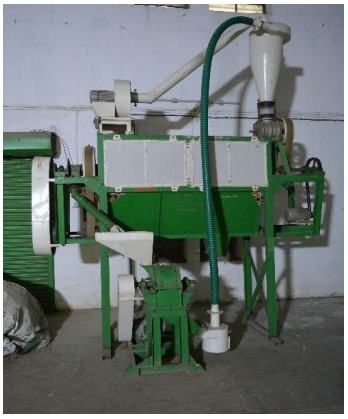
6.	Linseed: PDKV Sharda (PDKV ANAL 371)	• Yield: of 1019 Kg/ha. • Oil content: 37.5%. • Moderate resistance to linseed bud fly and wilt.	 
7.	Khirni variety PDKV-Aadhar (MGK-31)	• Yield: 22.50 Kg/tree. • Excellent rootstock for Sapota grafting. • Maximum Seed Germination. • Early Germination. • High Seedling Vigour. • High Survival Percentage. • Good Graft Compatibility with Scion.	  
8.	Custard apple - PDKV-Sangam (CA-12-03)	• Fruit yield: 19.89 kg/tree. • Bigger fruit size: 11.91 cm (Equatorial diameter) 12.79 (Polar diameter) • Average fruits/tree: 62.81. • Average fruit wt: 316.71 gm. • Pulp content: 63.11 %. • High TSS: 24.98^{O} B.	

9.	Wheat AKAW-5100 (Released at National Level)	• Yield: 49.3 qt/ha. • Maturity: 109 days. • Better quality of bread & chapati. • Heat and Drought tolerant • Resistant to black and brown rust.	
10	Maize Hybrid PDKV Aarambha (BMH 18-2) (Released at National Level)	**Peninsular Zone** • Grain yield: 99.7 qt/ha. • Released in Maharashtra, Karnataka, Andhra Pradesh, Tamil Nadu & Telangana States for Kharif season. • Medium maturity (95-102 days). • Moderate resistant to stem borer and American army worm. **Central West Zone** • Grain yield: 111.1 qt/ha. • Released in Madhya Pradesh, Gujarat, Rajasthan & Chhattisgarh state for Rabi season. • Moderately resistant to Fusarium Stalk Rot.	 
11	Sorghum CSV 65 Yellow (SPV 2906) (Released at National Level)	• Grain yield: 25-28 q/ha and fodder yield:110-115 q/ha. • Duration: 110-112 days. • Biofortified high Zinc: 23.2 PPM and Iron: 30.8 PPM. • Protein content:10.4 %.	

2) Released Farm implements/machineries

S.N.	Released implement/machinery	Salient features	Photograph of machinery
1	PDKV Engine Operated Soybean Harvester	• Suitable for harvesting the two rows of soybean crop simultaneously • Harvest the crop and lays it in the form of windrow which facilitates further collection of crop • The average harvesting losses was observed to be 3.16 %. • The effective field capacity and field efficiency were found to be 0.174 ha/h and 81.31 per cent, respectively. • 35.38 % saving in cost of harvesting over manually harvesting.	 
2	PDKV Power Operated Linseed Thresher	• Threshing efficiency 99.41%. • Threshing output capacity 25 kg/h. • Cleaning efficiency 96.97 %. • Overall grain losses 1.48 % • The saving in cost of threshing 37 % over the traditional method of manual threshing.	
3	PDKV Bullock Drawn No Till Paddy Planter	• The developed bullock drawn no till paddy planter is suitable for direct paddy planting. • The paddy seed rates varied from 35.88 to 53.76 kg/ha. • The field capacity 0.18 ha/hr and efficiency is 86.44% was found. • Reduces cost, labour and drudgery by eliminating seedling uprooting, puddling and transplanting of paddy.	 

4	PDKV Energy Efficient Bio-Mass Based Distillation System for Essential Oil Extraction from Medicinal Plants	• Capacity of the system is 200 liters (20kg/batch). • Used to extract essential oil from medicinal plants. • Average extraction efficiency is 85%. • Better quality essential oils extracted than conventional method. • Biomass fuel consumption is less (6 kg/h) than conventional method.	
5	PDKV Integrated Animal Deterrent Cum Solar Light Trap	• Operated completely on solar energy. • Suitable for two acres of area. • Simultaneous pest and wild animal control possible. • Suitable in integrated pest control. • Battery charging is through solar panel thus saves electricity.	
6	PDKV manual drawn solar photovoltaic powered fertilizer broadcaster	• The width of vermi compost spreading was found 5.7 m. • Actual field capacity and field efficiency of fertilizer broadcaster was found 0.62 ha/h and 71.0 % respectively. • Broadcasting of vermi compost was found uniform at 300 rpm spinning disc. • Saving in cost of operation 68% over the traditional manual broadcasting method. • Device work continuously for 12 h.	 
7	PDKV Small Capacity Portable Grain Cleaner Cum Grader	• It is suitable for cleaning grading of soybean and other grains. • The machine can easily move from one field to another field. • Capacity: 100 kg/h. • Power requirement: 0.5 hp electric motor. • Cleaning efficiency: 88 to 90 %. • Grading efficiency: 87 to 89 %.	

8	PDKV Mini Besan Mill	• Suitable for milling of *besan* from chickpea dal. • Capacity: 50 kg/h. • Motor: 8 hp • Recovery: 98 percent	
9	PDKV mobile dryer for soybean drying	• PDKV tractor operated dryer is suitable for drying of soybean and other grains. • Capacity: 2 tons/batch. • Tractor requirement: 35 hp • Temperature can be controlled. • Fuel : 1.5 liters diesel per hour and 17 kg wood per hour.	

3) Crop Production Technology Recommendations:

A	**Agricultural Botany**
1	Dr. PDKV developed technology for micro propagation of Spine gourd *var*. Akra Bharat *(Memordica cochinchinesis* L.*)*, a nodal segment of 2 cm size sterilized with 5% sodium hypochlorite 40 min = 0.2% Carbendazim, followed by 1.25 mg/L cefotaxime each for 60 min and explants inoculation on MS basic media (PH=5.8) supplemented each with 2 mg/L BAP + L-GA for it6s efficient shoot multiplication and MS + 1 mg/L NAA for high root induction, followed by hardening for 45 days with cocopeat: soil: FYM (1:2:1) proportion is recommended.
2	*Bacillus thuringiensis* isolates PDKV-Bt-SA-22, PDKV-Bt-SAk-12 and PDKV-Bt-SUd-1 are recommended for the submission in useful microorganism group and their further utilization in research.
3	Mustard genotypes ACN 226 and ACN 237 (PDKV Kartik) are terminal heat tolerant genotypes, therefore genotype ACN 226 and ACN 237 (PDKV Kartik) are proposed for registration.
B	**Natural Resource Management**
i	**Agronomy**
4	For higher seed yield and economic benefits in Vidarbha, sowing of rainfed chickpea is recommended from 15th Oct. to 04th Nov (42-44 MW). Delayed sowing in 05^{th}-11^{th} Nov (45 MW) results in 7% yield reduction, while 12^{th}-18^{th} Nov (46 MW) leads to 15% yield reduction.
5	For higher yield and monetary returns from Maize + Pigeonpea intercropping system, sowing of maize and pigeonpea in 6:1 intercropping system alongwith application of 180:90:90 NPK kg ha^{-1} is recommended.
6	For higher seed cotton yield and monetary returns under rainfed condition, sowing of cotton on broad bed and furrow and single spray of Salicylic Acid @ 100 ppm during long dry spell of rainfall is recommended.
7	In Eastern Vidarbha Zone for higher yield and monetary returns from rabi crops under zero cultivation sowing of chickpea crop is recommended after harvesting of *kharif* early varieties of rice.
8	For offseason soybean seed production only (upto 30% yield reduction compared to kharif season) sowing of soybean during 26^{th} November to 2^{nd} December (48^{th} Met Week) is recommended.
9	For higher yield and net monetary returns, sowing of linseed on Broad Bed Furrow during 12-25 November (46^{th} to 47^{th} Meteorological Week) is recommended in Eastern Vidarbha.
10	For effective weed management, higher pod yield and net return of kharif groundnut pre-emergence application of diclosulam 84% WDG, 26 g a.i./ha (formulation-30 g/ha) fb propaquizafop 2.5% + imazethapyr

	3.75%, 125 g a.i./ha (formulation-2.0 lit/ha) 25 DAS **OR** diclosulam 26 g a.i./ha (formulation-30 g/ha) as pre-emergence fb quizalofop ethyl 7.5% + imazethapyr 15%, 98.43 g a.i./ha (formulation-437.5 ml/ha) 25 DAS each through 500 litre of water are recommended.
ii	**Soil Science**
11	Application of 300 kg natural zeolite ha^{-1} along with recommended dose of fertilizers (90: 45: 45 N, P and K $kgha^{-1}$) is recommended for obtaining higher yield, monetary returns of Bt cotton and improving soil fertility in salt affected soils of Purna valley.
12	In medium deep black soil, for obtaining higher yield of sunflower, gross monetary return, oil seed quality and for improving the fertility status of soil, addition of biomass briquette ash @ 2.25 t ha^{-1} as a source of potassium along with recommended dose of 80:60 N P kg ha^{-1} is recommended.
13	To improve the nutrient balance and to achieve optimal fruit yield in banana fruit crop in Vidarbha, it is recommended that, new DRIS indices preferably for soil should be used fordiagnosing sufficiency and deficiency of nutrients. Accordingly, the blanket RDF of primary nutrients should be modified on the basis of new DRIS norms as: in very low/ deficient category- 50% more, low-25% more, optimum- no change, high-25% less and very high/excess- 50% less. The secondary and micro-nutrients with most negative DRIS index value only should be applied as per RDF.However, it is also recommended to use either soil fertility or leaf nutrient or both new DRIS norms given in following tables as per convenient to farmers.

Table 1. New DRIS norms for soil fertility status of banana orchards

Soil parameter/ Available nutrient (unit)	Very low (Less than)	Low	Optimum	High	Very high (More than)
pH	7.12	7.13 - 7.47	7.48 - 8.17	8.18 - 8.52	8.53
EC (dSm-1)	0.06	0.07-0.11	0.12- 0.43	0.44 - 0.59	0.60
Organic Carbon (g kg-1)	3.34	3.35 - 4.97	4.98 - 8.24	8.25 - 9.88	9.89
CaCO3 (%)	2.02	2.03-4.03	4.04-14.55	14.56-19.81	19.82
N (kg ha-1)	150.00	151 - 194	195 - 282	283 - 327	328
P2O5 (kg ha-1)	7.00	8 - 13	14 - 48	49 - 65	66
K2O (kg ha-1)	268.00	269 - 453	454 - 824	825 - 1009	1010
Ca (c mol(p+) kg-1)	12.45	12.46 - 21.14	21.15 - 38.52	38.53 - 47.2	47.21
Mg (c mol(p+) kg-1)	2.05	2.06 - 4.1	4.11 - 24.58	24.59 - 34.82	34.83
S (mg kg-1)	4.64	4.65 - 9.28	9.29 - 32.9	32.91 - 44.71	44.72
Fe (ppm)	0.74	0.75 - 1.47	1.48 - 14.15	14.16 - 20.48	20.49
Mn (ppm)	1.63	1.64 - 3.25	3.26 - 17.59	17.6 - 24.76	24.77
Cu (ppm)	0.60	0.61 - 1.2	1.21 - 4.87	4.88 - 6.71	6.72
Zn (ppm)	0.13	0.14 - 0.26	0.27 - 0.98	0.99 - 1.34	1.35
Yield (ton ha-1)	74.00	75 - 86	87 - 109	110 - 120	120

Table 2. New DRIS norms for leaf nutrient status of banana orchards.

Leaf nutrient (unit)	Deficient (Less than)	Low	Optimum	High	Excess (More than)
N (%)	1.69	1.7 - 2.37	2.38 - 3.74	3.75 - 4.42	4.43
P (%)	0.11	0.12 - 0.22	0.23 - 0.43	0.44 - 0.54	0.55
K (%)	2.45	2.46 - 3.56	3.57 - 5.76	5.77 - 6.86	6.87
Ca (%)	0.34	0.35 - 0.68	0.69 - 2.49	2.5 - 3.39	3.40
Mg (%)	0.41	0.42 - 0.61	0.62 – 1.00	1.01 - 1.20	1.21
S (%)	0.15	0.16 - 0.31	0.32 - 0.64	0.65 - 0.80	0.81
Fe (ppm)	98.00	99 - 159	160 - 282	283 - 343	344
Mn (ppm)	273.00	274 - 547	548 - 1796	1797 - 2421	2422
Cu (ppm)	2.00	2.01 - 3.99	4 - 13.19	13.2 - 17.79	17.80
Zn (ppm)	5.79	5.8 - 19.79	19.8 - 47.78	47.79 - 61.77	61.78
Yield (ton ha-1)	74.00	75 - 86	87 - 109	110 - 120	121

14	For higher seed cotton yield and monetary returns from Bt-cotton and improvement in soil fertility, application of 75 % (90:45:45 kg N, P_2O_5 and K2O ha^{-1}) recommended dose of fertilizers through Urea and Muriate of potash (MOP) in five splits through fertigation **(**with P as basal at sowing) is recommended under drip irrigation.

Fertilizer split	Percent split	Time
1st	10 % N & K (9 kg N + 4.5 kg K)	At sowing
2nd	20 % N & K (18 kg N + 9 kg K)	20 DAS
3rd	25 % N & K (22.5 kg N + 11.25 kg K)	40 DAS
4th	25 % N & K (22.5 kg N + 11.25 kg K)	60 DAS
5th	20 % N & K (18 kg N + 9 kg K)	80 DAS

15	For obtaining higher yield under rainfed Bt-cotton, it is recommended to apply foliar sprays of PDKV Micro-Grade XI @ 1 % at 45 and 60 days after sowing along with 100% (90:45:45 N, P2O5 and K2O kg ha-1) recommended dose of fertilizers
16	For obtaining higher yield and economic return of summer groundnut and for improvement in soil fertility status, soil application of recommended dose of fertilizer (25: 50:30 kg ha-1 N, P2O5and K2O) with zinc EDTA + Fe EDDHA @ 1.5 kgha-1 eachat the time of sowing along with foliar application of Zn EDTA @ 0.5 % + Fe EDDHA @ 1.0 % at 35 DAS and 65 DAS is recommended.
17	In zinc deficient soil for obtaining higher wheat yield, monetary return and for improving soil fertility status, soil application of zinc sulphate @ 15 kg ha-1 or zinc EDTA @ 1.5 kg ha-1 along with recommended dose of fertilizer (80:40:40 kg ha-1 N, P2O5 and K2O) is recommended.
18	Application of 50 % through FYM (6t ha^{-1}) or vermicompost (1.5 t ha^{-1}) + 50 % N through Gliricidia (4 t ha^{-1}) + Phospho-compost-phosphate rich organic manure (190 kg ha^{-1}) is recommended for rainfed organic cotton for sustainable productivity in vertisols.
C	**Horticulture**
i	**Fruit Science**
19	Spraying of NAA 300 ppm at fruit setting stage for abdonment of ambia bahar and getting higher yield and more economic return in subsequent mrig bahar of mandarin is recommended for vidarbha region.
20	In Vidarbha region, for reduction of *waibar* disorder in Nagpur mandarin, it is recommended to apply following schedule per plant. 1. At the time of stress release (January) 300g N+150g P+150g K 1000 ppm+5Kg. $acre^{-1}$ Arka microbial consortium (Soil application). 2. After 1 month of 1st application (February) 300 g N + 150 g P + 150 g K 3. After 1 month of 2nd application (March) 300 g N + Foliar spray of 0.2 % micronutrients (Cu, Fe, Mn, Zn). 4. In the month of April – May spray of NAA 10 ppm. 5. In the month of June – July spray of Nimbodi Ark 5% + 2,4-D 10 ppm. 6. In the month of August – September, spray of Propergite 57% EC 0.2% + 1% Potassium nitrate (KNO_3). 7. Seven doses of Jivamrut 10 L $plant^{-1}$ applied at 15 days interval (Jan-April).
ii	**Vegetable Science**
21	For getting higher yield and monetary returns from organic seed production of fenugreek, application of vermicompost @ 3.0 t ha^{-1} OR FYM @ 6.0 t ha^{-1} **OR** enriched compost @ 3.5 t ha^{-1} + seed treatment of Rhizobium & PSB (@ 10ml/kg seed each) is recommended.
22	For getting higher yield and monetary returns from organic seed production of spinach, application of vermicompost @ 7.40 t ha^{-1} OR FYM @ 15.5 t ha^{-1} OR enriched compost @ 9.0 t ha^{-1} + seed treatment of Azatobactor & PSB (@ 10ml/kg seed each) is recommended.
23	For obtaining higher yield and monetary returns of turmeric, it is recommended to use finger rhizomes as planting material with soaking in GA3 100 ppm for 30 minutes and spraying of Cocycel 250 ppm at 60 and 90 days after planting.
24	For preparation of higher quality beetroot powder pre-treatment steam blanching of 3 mm thick beetroot slices for 3 minutes and cabinet tray drying at 50°C temperature for 12 hrs. is recommended.

<table>
<tr><td>iii</td><td>Floriculture</td></tr>
<tr><td>25</td><td>Application of 250:100:100 kg NPK per hectare per year in four equal splits, first splits, first split at the time of clipping and remaining at three months interval after clipping is recommended for better vegetative growth, flower yield and bulb production of spider lily.
• At the time of clipping – First fortnight of June: 62.50:25:25 Kg, NPK/ha.
• At 90, 180 and 270 days after clipping: 62.50:25:25 Kg, NPK/ha.</td></tr>
<tr><td>26</td><td>Dipping of hardwood cuttings of Croton in IBA-400 ppm concentration solution for five minutes is recommended for commercial propagation.</td></tr>
<tr><td>iv</td><td>Agroforestry</td></tr>
<tr><td>27</td><td>For preparation of energy pellets of higher calorific value from bamboo it is recommended to mix 10 % Moha cake + Sal cake as binder in equal proportion</td></tr>
<tr><td>D</td><td>Animal Husbandry & dairy Science.</td></tr>
<tr><td>28</td><td>For preparation of good quality value added Paneer Whey beverage blending of 15 % Pomegranate juice with 0.5 % Ginger extract, 0.3 % Beetroot juice and 8 % Sugar in Paneer Whey is recommended.</td></tr>
<tr><td>E</td><td>Plant Protection</td></tr>
<tr><td>i</td><td>Plant Pathology</td></tr>
<tr><td>29</td><td>Alemow (Citrus microphylla) is recommended as a Phytophthora root rot tolerant rootstock due to its low susceptibility to root rot, the least feeder root rot rating and leaf fall percentage, and the lowest population density of Phytophthora.</td></tr>
<tr><td>30</td><td>For effective management of sooty mould disease in acid lime orchards, it is recommended to apply two sprays of mineral oil micro-emulsion adjuvant @ 5 ml per liter of water at an interval of 15 days as soon as black mold appears on the foliage.</td></tr>
<tr><td>31</td><td>Hypocrella raciborskii (Aschersonia) is recommended as a beneficial effective entomopathogen of citrus black fly.</td></tr>
<tr><td>ii</td><td>Entomology</td></tr>
<tr><td>32</td><td>For effective management of pests like citrus psylla, fruit flies and fruit sucking moth causing fruit drop in Nagpur mandarine during Ambia bahar and for getting higher fruit yield with better economic returns it is recommended to adopt following plant protection module:
Plant Protection Module
<table>
<tr><td>June-
July</td><td>• Installation of Yellow sticky traps 30/acre on 2.0 mtr height from soil surface from 1st week of June (trap change at monthly interval).
• Spraying of neem oil 10 ml / L (1 %) with detergent powder at new flush during 1st week of June.
• Foliar application of imidacloprid 17.8 % SL @ 0.5 ml / L of water during 1st week of July.</td></tr>
<tr><td>August-
September</td><td>• Foliar application of neem oil 10 ml / L (1 %) with detergent powder during 1st week of August.
• Foliar application of thiamethoxam 25 % WG @ 0.3 g/L water during 1st week of September.
• Installation of poison bait consisting of malathion 50 % EC @ 10 ml + 100 g Jaggary + 100 ml mandarin juice + 900 ml of water (two bottles of poison bait per 25-30 trees) with a 60-watt bulb fixed over it to attract moths during night time during 2nd week of September</td></tr>
<tr><td>October-
November</td><td>• Installation of methyl eugenol trap @ 20 / ha during 1st week of October [change lure at every 15-20 days interval].
• Application of karanja oil @ 20 ml / L (2 %) with detergent powder during 1st week of October.</td></tr>
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OR
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<tr><td>June-
July</td><td>• Spraying of karanja oil @ 20 ml / L (2 %) with detergent powder at new flush during 1st week of June.
• Foliar application of thiamethoxam 25 % WG @ 0.3 g/L of water during 1st week of July.</td></tr>
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	August-September	• Foliar application of imidacloprid 17.8 % SL @ 0.5 ml / L of water during 1st week of August. • Installation of methyl eugenol trap @ 20 / ha during 1st week of August [change lure at every 15-20 days interval] • Foliar application of thiamethoxam 25 % WG @ 0.3 g/L of water during 1st week of September. • Generation of smoke in late evening hours in orchards to repel the adult of fruit sucking moth from 1st week of September onward
	October-November	• Periodical collection and destruction of fallen fruits under trees at weekly interval starting from 1st week of October. • Foliar application of neem oil @ 10 ml / L water (1%) with detergent powder during 1st week of October
33	For effective management of onion thrips and for getting higher bulb yield with better return following plant protection module is recommended. • Installation of yellow and blue sticky traps @ 5 each/ acre at 20 days after transplanting. • Spraying of neem oil 300 ppm @ 300 ml/10 L of water at 40 days after transplanting. • Spraying of *Verticillium lecanii* 3.0 % AS @ 50 g / 10 L of water at 55 days after transplanting. • Spraying of deltamethrin 11 % EC @ 3 ml/ 10 L of water at 70 days after transplanting. • Spraying of fipronil 80 % WG @ 1.5 G /10 L of water 85 days after transplanting. **OR** • Spraying of lambda-cyhalothrin 5% EC @10 ml/10 L of water 40 days after transplanting. • Spraying of dimethoate 30 EC @13.2 ml/10 L of water 55 days after transplanting. • Spraying of deltamethrin 11 % EC @ 3 ml/ 10 L of water 70 days after transplanting. • Spraying of fipronil 80 % WG @ 1.5 G /10 L of water 85 days after transplanting.	
34	For effective management of sap-sucking pests on chilli, brinjal and tomato it is recommended to use 30 micron silver polythene mulch on soil at the time of transplanting these crops.	
35	For effective management of gram pod borer on chickpea and getting higher returns, spraying of emamectin benzoate 5 % SG @ 4.4 g at 50 per cent flowering followed by spraying of a combi product, novaluron 5.25 % + indoxacarb 4.50 % SC @ 16.5 ml in l0 liters of water, 15 days after first application is recommended.	
36	For effective management of linseed bud fly and getting higher yield, two applications of PDKV *Dashparni* extract [5 parts of neem leaves + 2 parts each of Ghaneri (*Lantena camera*), *Karanj* (*Pongamia pinnata*), Kanher (*Nerium indicum*), Castor (*Ricinus communis*), Gulvel (*Tinospora cordifolia*), Custard apple (*Annona squamosa*), Rui (*Calotropis procera*), Papaya (*Carica papaya*) and Nirgudi (*Vitex negundo*) leaves) or neem seed extract prepared by Rosukon method (i.e. fermentation of 3 parts of botanical + 1 part jiggery in 10 parts water for 3 months) @ 300 ml per 10 L of water at 10 days interval from bud initiation stage is recommended	
37	For effective management of thrips and leafhoppers on summer groundnut and getting higher monetary returns, spraying of neem seed extract 5% at 15 days after seed germination followed by spraying of quinolphos 25% EC @ 28 ml/ 10 L of water at 30 days after seed germination is recommended.	
38	For effective biorational management of citrus black fly after the initiation of infestation two sprays of entomapathogenic fungus *Aschersonia aleyrodis* (CFU 1.5 x 10^8 spore/ml) @ 20ml / 10 L of water at 15 days interval is recommended (Research Finding)	
39	For effective management of chilli thrips and mites and for getting increased yield with maximum net return following plant protection module is found effective: • Sweeping of castor oil treated white muslin cloth (6m x 2m) on crop in morning hours + installation of blue & yellow sticky traps (60:40) @ 40/acre and spraying of neem oil @ 3% + propergite 57 EC @ 30 ml in 10 L water at 15 days after transplanting • Spraying of emamectin benzoate 0.5 SG @ 4 gm+ propargite 57 EC @ 30 ml in 10 L water at 30 days after transplanting • Spraying of bioinnoculant (*Verticilium lecani + Metarrhizium anisoplae + Beauveria bassiana)* @ 40 ml in 10 L water at 45 days after transplanting • Sweeping of castor oil treated muslin white cloth (6mx2m) on chilli crop in morning hours + installation of blue & yellow sticky traps (60:40) @ 40/acre and spraying of neem oil 3% + propergite	

	• 57 EC @ 30ml in 10 L of water at 60 days after transplanting Spraying of mixed insecticide flubendamide 19.92% + thiacloprid 19.92% @ 5ml /10 L water at 75 days after transplanting
F	**Agricultural Engineering & Technology**
i	**Soil Water Conservation Engg.**
40	PDKV developed seepage meter is recommended to measure seepage (Seepage and Percolation) losses from pond.
41	PDKV developed IoT based instrument used to measure evaporation and seepage losses with accuracy 98 percent for management of store water in the farm pond to scheduling the irrigation is recommended.
42	Combination of 70:30 (Farm Pond Water: Ground Water) is recommended for irrigation to cotton, pigeon pea and chick pea for higher productivity in Purna valley of Vidarbha region.
ii	**Irrigation & Drainage Engg.**
43	It is recommended to use the crop coefficient values given in table for determining water requirement of cotton crop.

Week after sowing	Crop coefficient	Week after sowing	Crop coefficient
1	0.54	13	1.19
2	0.57	14	1.20
3	0.62	15	1.19
4	0.68	16	1.17
5	0.75	17	1.13
6	0.83	18	1.08
7	0.90	19	1.02
8	0.97	20	0.95
9	1.04	21	0.87
10	1.09	22	0.79
11	1.14	23	0.71
12	1.17	24	0.62

Alternative for above table following equation is recommended.

$$Kc_t = 5.9661\left(\frac{t}{T}\right)^4 - 14.115\left(\frac{t}{T}\right)^3 + 8.3452\left(\frac{t}{T}\right)^2 + 0.1003\left(\frac{t}{T}\right) + 0.5285$$

Kc_t - Crop coefficient of t^{th} day.
t - Day after sowing
T - Total period of crop

44 It is recommended to use the crop coefficient values given in table for determining water requirement of pigeon pea crop.

Week after sowing	Crop coefficient	Week after sowing	Crop coefficient
1	0.54	14	1.15
2	0.56	15	1.16
3	0.59	16	1.16
4	0.64	17	1.15
5	0.70	18	1.13
6	0.76	19	1.10
7	0.82	20	1.05
8	0.88	21	1.00
9	0.94	22	0.94
10	1.00	23	0.87
11	1.05	24	0.79
12	1.09	25	0.72
13	1.13	26	0.64

Alternative for above table following equation is recommended.

$$Kc_t = 5.3467\left(\frac{t}{T}\right)^4 - 13.253\left(\frac{t}{T}\right)^3 + 8.3885\left(\frac{t}{T}\right)^2 + 0.3899\left(\frac{t}{T}\right) + 0.5476$$

Kc_t	-	Crop coefficient of t^{th} day.
t	-	Day after sowing
T	-	Total period of crop

45 For clay loam soils in western Vidarbha region, it is recommended that the overhead sprinkler (4ft, 9 lpm, 50% overlapping) should be operated for four hours during critical stages of chickpea i.e. flowering and pod formation to maintain favourable moisture content in the root zone.

46 For high density plantation of Nagpur mandarin with spacing of 6m x 3m (Fully matured), application of water soluble fertilizers through drip fertigation with the dose of 663-220-330 (N-P-K, g/pant) or 368-122-183, (N-P-K, kg/ha) in 18 splits at 14 days interval as per schedule given below is recommended for getting higher yield and superior quality of fruits, with more economic returns.

Split schedule for fertigation:

Sr. No	Stage	No of Days	No of splits	Split No	Quantity of fertilizers through drip g/plant					
					N		P		K	
					g/plant	kg/ha	g/plant	kg/ha	g/plant	kg/ha
1	Blossom	42	03	1	55.24	30.66	21.98	12.2	27.48	15.25
				2	55.24	30.66	21.98	12.2	27.48	15.25
				3	55.24	30.66	21.98	12.2	27.48	15.25
2	Fruit set	42	03	4	55.24	30.66	21.98	12.2	27.48	15.25
				5	55.24	30.66	21.98	12.2	27.48	15.25
				6	55.24	30.66	21.98	12.2	27.48	15.25
3	Fruit Growth Stage 1	84	06	7	38.67	21.46	7.32	4.06	16.49	9.15
				8	38.67	21.46	7.32	4.06	16.49	9.15
				9	38.67	21.46	7.32	4.06	16.49	9.15
				10	38.67	21.46	7.32	4.06	16.49	9.15
				11	38.67	21.46	7.32	4.06	16.49	9.15
				12	38.67	21.46	7.32	4.06	16.49	9.15
4	Fruit Growth Stage 2	84	06	13	16.50	9.16	7.32	4.06	10.99	6.1
				14	16.50	9.16	7.32	4.06	10.99	6.1
				15	16.50	9.16	7.32	4.06	10.99	6.1
				16	16.50	9.16	7.32	4.06	10.99	6.1
				17	16.50	9.16	7.32	4.06	10.99	6.1
				18	16.50	9.16	7.32	4.06	10.99	6.1
	Total	**252**	**18**		**663.06**	368	**220**	**122**	330	**183**

iii Renewable Energy Engg.

47 It is recommended to use the mixture of crop residues of cotton and pigeon pea crop having particle size 4 mm, 30±2 per cent moisture content and pyrolysed biochar 10 per cent for enhancing the quality of pellets during pelletisation through double roller flat die type pelleting machine.

iv Agril. Process Engg.

48 For preparation of millet based PDKV cookies, flour mixing speed with other ingredients as 400 rpm for 20 min and baking temperature of 180°C for 20 min is recommended along with following pre-treatments,
a. Sprouting for pearl millet and proso millet grain b. Pearling for finger millet grain c. Blanching for sorghum grain

49 For preparation of millet based PDKV cupcake, flour mixing speed with other ingredients as 200 rpm for 15 min and baking temperature of 180°C for 25 min is recommended along with following pre-treatments,
a. Sprouting for pearl millet and sorghum grain
b. Blanching for finger millet grain
c. Pearling for proso millet grain

50 For preparation of millet based PDKV toast, flour mixing speed with other ingredients as 400 rpm for 20 min and consecutive baking temperature of 180ºC and 160ºC for 25 and 20 min respectively is recommended along with following pre-treatments,
a. Blanching for pearl millet and sorghum grain b. Sprouting for finger millet grain c. Pearling for proso millet grain

51	For preparation of millet based PDKV breadstick, flour mixing speed with other ingredients as 400 rpm for 15 min and baking temperature of 180°C for 15 min is recommended along with following pre-treatment, a. Pearling for pearl millet and proso millet grain b. Sprouting for finger millet grain c. Blanching for sorghum grain is recommended.
52	PDKV developed process for pectin extraction from Nagpur mandarin peel is recommended for maximum pectin recovery.
53	PDKV-developed mocktail processing technology is recommended for preparation of mocktail from Nagpur mandarin fruit, after removal of peel the fruits blanched for 5 minutes and extracted juice used for the preparation of mocktail and storing it in glass bottles for up to 90 days
v	**Farm Structure Engg.**
54	It is recommended to use PDKV developed hydroponic structure (length 25 m, width 19.5 m, height 5.5 m) for growing of leafy greens. Salient Features: • NFT pipe length: 6 m • No. of holes per pipe: 35 • No. of channels: 18 • Total no. of holes: 6300
55	It is recommended to use PDKV developed sensor based IoT device for monitoring and controlling environmental parameters (Temperature: 22-25°C, humidity 60-80% and light intensity less than 80,000 lux) in protected structures.
G	**Social Science**
i	**Agricultural Extension Education**
56	According to the study, 31.18 per cent of Agricultural Technical School diploma holders are engaged in entrepreneurship in areas such as dairy farming, poultry farming, goat rearing, vegetable cultivation, and vermicomposting. Meanwhile, current students are primarily interested in agricultural value-added products (81.25%), dairy farming (77.80%), poultry farming (65.42%), fruit and vegetable production (62.50%) and goat rearing (46.67%). Therefore, it is recommended that relevant institutions should establish specialized study modules related to these areas in Agricultural Technical Schools for providing hands-on technical training facilities to the students.
57	In the study of technological gap in adoption of fruit drop management practices in mandarin, higher technological gap was found in drainage management (82.50%), proper selection of soil (77.91%), nutrient management (76.33%), selection of genuine planting material (71.67%) and pest and disease management (53.12%). Hence, it is recommended that, while organizing the demonstrations and training programmes for mandarin growers, the major emphasis should be given on drainage management, proper selection of soil, nutrient management, selection of genuine planting material and pest and disease management practices by the extension agencies.
58	The study on soybean crop revealed that 50.00 per cent of soybean-growing farmers lacked knowledge about seed treatment and 43.00 per cent of farmers did not treat their seeds before sowing. Therefore, it is recommended that agricultural extension agencies should organize training programs to highlight the importance of seed treatment.
59	83.33 percent of the farmers expressed that the annual agricultural exhibition (AGROTECH) organized by Dr. Panjabrao Deshmukh Krishi Vidyapeeth Akola, was highly effective and the organization was satisfactory. Additionally, 75.83 per cent of farmers who visited the exhibition reported an increase in their knowledge. Therefore, it is recommended that the state government may provide independent funding to the four agricultural universities in the state to organize such exhibitions on a regular basis.
60	Farmers reported that the unavailability of biofertilizers and biocontrol products at the local level was a major constraint, resulting in limited use (38.08%). Therefore, it is recommended that Farmer Producer Organizations (FPOs) and extension agencies should arrange for quality biofertilizers and biocontrol products to be made available to the farmers at local level.

61	To protect the income of paddy growers, disrupt the life cycle of pests and diseases affecting paddy and to address challenges in adopting alternative crops for summer paddy, extension agencies should focus on strategic extension planning. Additionally, comprehensive extension programs should be implemented to promote alternative crops having higher monetary returns such as watermelon, tomato, brinjal, sesame, summer groundnut, and green gram.
ii	**Agricultural Economics**
62	The productivity of Nagpur mandarin under Indo-Israel High density plantation technology was increased by 18.40 ton/ha over traditional method i.e. 218 per cent more. However, the additional return increased by 258 per cent. Hence, it is recommended that Indo-Israel High density plantation technology should be disseminated on large scale by Government through extension agencies
63	The farmers earned gross economic benefit of Rs. 636 Crores during last seventeen year (2007-08 to 2023-24) from PKV Kranti variety of sorghum released by Dr. PDKV, Akola. Hence, it is recommended that for economic upliftment of farmer, government should provide sufficient fund to the University for further research, extension and development for improved new varieties of sorghum, seed production and mechanization.
64	The benefit-cost ratio of summer vegetables i.e. okra (2.19), brinjal (1.93), tomato (1.86) and chilli (1.79) were estimated more than one along with better technical and economic efficiency. Hence it is recommended that the farmers of Eastern Vidarbha Zone should be motivated through extension agencies for cultivation of these summer vegetables for economic upliftment.
65	In Eastern Vidarbha Zone the benefit-cost ratio of Linseed (1.47) and Mustard (1.41) crops cultivation were more than one. Hence it is recommended that the farmers of Eastern Vidarbha Zone should be motivated for cultivation of Linseed and Mustard through extension agency for economic upliftment.
66	The BEP for Linseed and Mustard were 1067 and 441 kg oil along with percentage margin of safety 22 and 18 per cent respectively. The processing units for both the crops is profitable venture. Hence it is recommended that Government should provide the financial scheme for establishment of such processing unit in Eastern Vidarbha Zone and farmers should be motivated for establishment of processing unit through extension agencies.
67	Due to fruit drop in orange orchards per hectare, the percentage increase in productivity of high adopters of Standard Operating Practices (SoP) over low adopters was 51.14 per cent. Similarly total production losses and economic losses due to fruit drop have been decreased by 49.33 and 21.11 per cent respectively. Hence, it is recommended that, the university recommended Standard Operating Practices (SoP) to avoid fruit drop should be promoted and disseminated regularly through the extension agencies for high adoption.
68	The cropping intensity has increased from 117 to 124 per cent during the period 2023-24 to 2024-25. Similarly, the productivity of gram, safflower and wheat has increased by 1.42 to 12.46 q/ha, 1.88 to 7.75 q/ha and 15.32 to19.34 q/ha, respectively due to farm ponds. Hence, it is recommended that, Government should provide financial support to Government Institutions for establishment of farm ponds along with irrigation systems to enhance the seed production and motivate the farmers for establishing farm ponds through extension agencies
69	In India, to maintain the Equilibrium Price of Onion i.e. Rs. 1958 per quintal (year constant at 2024), the moderate arrival should be 14.07 lakh tons per month. In the month of March and June, Arrival index has been highest; however, price index has been lowest and vice versa situation was seen in the month of October, which deviates from moderate arrival and equilibrium price. Therefore, it is recommended that the Onion export should be promoted in the month of March and June and buffer stock should be increased to stabilize the price through open market by NAFED (National Agricultural Cooperative Marketing Federation of India Ltd). However, Onion buffer stock can be released in the month of October. Farmers should be encouraged to construct the On-farm Modern Onion Storage Structures / Onion Storage Centers through Government schemes to control price fluctuation.
70	The arrival and prices of paddy, were negatively correlated at APMC market. However, the storage capacity is only 7 per cent of total production in Gadchiroli district. Hence, it is recommended that, to stabilize the prices of paddy Government needs to take initiative to increase the storage capacity and provide small to medium size godown to the farmers.