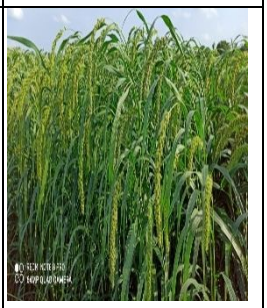
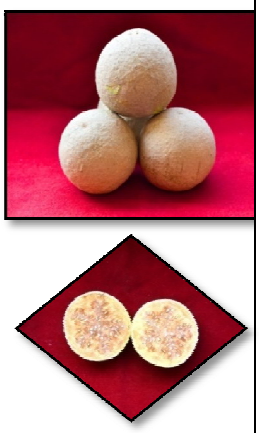
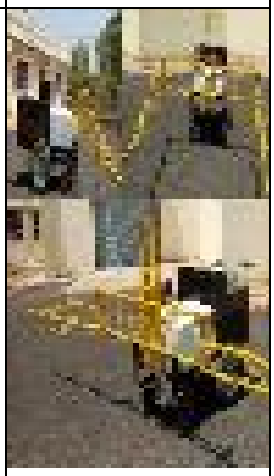
Directorate of Research
Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola
(Research Recommendations released during the year 2022-2023)

Research Accomplishments and Recommendations-2023

SN.	Released Variety/Hybrid	Recommendation	Silent features	
Field Crops				
1	Maize Variety PDKV Aarambha (ABMH 18-2)	Maize hybrid BMH 18-2 (PDKV Aarambha) having high grain yield, high fodder yield and medium maturity is recommended for Kharif plantation in Maharashtra.	• Production:101.63 qt/ha • Duration: 95-100 days • Medium Maturity • Suitable for rainfed condition • Moderately resistant to Turcicum leaf blight disease	 
2	Foxtail millet Variety PDKV Yashshree (BFTM – 82)	Foxtail Millet variety PDKV Yashshree Variety (BFTM 82) with higher grain yield, higher fodder yield, tolerant to blast and rust disease is recommended for cultivation in Maharashtra during kharif season.	• Production: 23.34 qt/ha • Duration: 81-85 days • Attractive yellowish grains • Compact panicles • Tolerant to Blast and Rust disease	 
3	Sunflower Variety PDKV Suraj (PDKVSH 964)	Sunflower hybrid PDKV Suraj (PDKV SH 964) WITH high seed yield and oil yield, with medium maturity, moderately resistant to Alternaria and leaf hopper is recommended for cultivation in Maharashtra.	• Average Yield capacity: 18-22 qt/ha • Oil percent: 37-38 % • Belongs to medium maturity duration (matures in 89-90 days) • Blackish seed with elongated shape • Moderately resistant to Alternaria and leaf hopper.	 

Horticulture crops				
4	Wood apple Variety PDKV Pratap AKWa-1402	Wood apple variety PDKV- Pratap (AKWa-1) regular bearer with bigger size of fruit, high yielder and more pulp content is recommended and release for cultivation under hot and dry climatic conditions of Maharashtra state.	• Regular bearer • Bigger size of fruits - Average fruit wt : 489 g • More number of fruits /tree (347) • Higher pulp content – 66.27%	
5	Garlic genotype PDKV Purna (AKG-07)	High yielding garlic variety PDKV Purna (AKG-07) having white coloured bulb, high TSS and allicin content with longer storability and minimum storage losses is recommended for rabi season cultivation in Maharashtra state.	• Yield - 119.62 q/ha. • Bulbs- Bright white coloured and 21g average bulb weight. • Suitable for medium maturity group (130 to 135 DAP). • Longer storability with minimum storage losses (11.15 %). • Moderately tolerant to thripsand resistant to purple blotch.	 

B) Released farm implements / machineries:

Sr. No.	Released impleme	Recommendation	Silent features	
1	PDKV developed battery electric vehicle sprayer	PDKV developed battery electric vehicle sprayer is recommended forspraying operationin various row crops like green gram, soybean, chickpea etc.	• Battery electric vehicle operated sprayer satisfactorily transverse in between 30, 45, 60 and more than 90 cm row spacing crops. • It is suitable for spraying in the low heighted row crops. • It reduces the dependency from costly fissile fuels and promotes the use of green energy • It satisfactorily sprays the liquid at bottom top and middle part of the crops. • The field efficiency of the sprayer was 1.09 ha/ha whereas the cost of operation	

2.	PDKV developed biochar production process from agro-residue	PDKV developed continuous biochar reactor having a capacity of 30 kg/h is recommended for release to convert agro residues such as cotton stalk into high valued biochar	• Capacity: 30kg/h • Biochar reactor converts cotton stalk into biochar • Saves time, electrically operated and require less time than conventional method. • Machine is efficient and yield is 35%. • Produces 75% more yield than traditional method. • Produces high valued biochar (fixed carbon 67% calorific value 5015kcal/kg and iodine value 330 mg/g)	 
3	PDKV Custard Apple Peel and Pulp Separation Machine	PDKV peel and pulp separation machine is recommended to release for separation of custard apple peel and pulp.	• Suitable for separation of custard peel and seeded pulp. • Pulp separation efficiency of machine is 92.60 per cent. • Capacity of machine is 80.15 kg/h. • Machine can be operated on 0.5 hp single phase electric motor. • This machine is useful for custard apple processor.	 
4.	PDKV wood apple cutting machine	PDKV developed wood apple fruit cutting machine is recommended to release for cutting of wood apple.	• Machine size: 914 mm H X 470 mm W X 304 mm T • Capacity: 200 kg/h • Motor power: 1 Hp Single phase • Ease of use and maintenance: Machine is easy for both to use and maintenance.	
५.	PDKV solar powered animal deterrent rotating light device for crop protectio	PDKV developed solar powered animal deterrent device is recommended to protect the crop from wild animals.	• Solar powered animal deterrent device • Protect the crop from wild animals. • Wild animals get scared due to the light and noise that move in the night.	

६.	PDKV solar based insect trap device	PDKV developed multipurpose phero sticky light insect trap of six units per hectare is recommended for insect pest management as per integrated pest management technique.	• Solar based insect trap device • Recommended to use six units per hectare • Suitable for control of pest.	

c) Research Recommendations-

1	After receipt of sufficient monsoon rains (75 to 100 mm) sowing of soybean in Vidarbha during 25 June to 08 July is recommended for higher seed yield and economic returns. Later sowing from 09 July to 22nd July results in yield reduction to the extent of 36 %.
2	For obtaining higher green chilli yield and monetary returns under drip fertigation,it is recommended to apply RDF along with six foliar sprays of humic acid @ 1% (100 ml per 10 liter water) with first spray at flowering, 2nd at fruit setting, thereafter four sprays at 15 days after each picking.
3	For obtaining higher yield, improving quality of maize, higher monetary return as well as improvement in soil fertility and soil organic carbon the application of RDF along with biochar @ 5 t ha^{-1} is recommended.
4	Melghat hilly region eroded reddish-gray soils of Amaravati district are classified as Medium deep (Inceptisol), Shallow (Entisol) and Deep soils (Vertisol) and as per land evaluation and soil site suitaibility, medium deep and deep soils are suitable for cultivation of sorghum, soybean, pigeonpea, chickpea and wheat crops, however shallow soils are suitable for silvipasture and agroforestry. Thus, for food and feed security of tribals of Chikhaldra and DharniTahasil cultivation sorghum/soybean and pigeon pea as intercropping kharif and on the basis of availability of irrigation, rabi chickpea or wheat crops are recommended.
5	For obtaining higher productivity, quality and monetary returns in Ambiabahar of Nagpur Mandarin ,application of 300 g K per tree along with RDF at the time of bahar treatment and 300 g K per tree after 60 days and foliar spray of KNO_3 @ 1.5% after 90 days of bahar treatment is recommended in medium deep black soils of Vidarbha region.
6	For balance nutrition and higher yield of wheat with maintaining soil fertility, in-situ burying of sunhemp 30 DAS alongwith addition of Ghanjivamrut @ 5 t ha^{-1} before sowing and seed treatment of Azotobactor + PSB and basal dose of 50 % N and P_20_5 (50 kg N and 25 kg P_20_5 ha^{-1}) and top dressing with two foliar spray of jivamrut @ 500 lit ha^{-1} (1:100 ratio) at tillering and jointing stage is recommended.
7	For obtaining 15q targeted seed yield of rainfed Bt Cotton, higher economic returns and improved soil fertility, an application of 5 ton FYM along with chemical fertilizers as per fertilizer prescription equation is recommended in medium deep black soils of Vidarbha region **Targetted yield equation** **Fertilizer Nitrogen kgha^{-1}** (10.71 x Targetted yield qha^{-1}) - (0.42 x Soil nitrogen kgha^{-1})- (2.38x FYM) **Fertilizer Phosphorus kgha^{-1}** (5.13 x Targetted yield qha^{-1}) - (2.55 x Soil Phosphorus kgha-1)- (0.65 x FYM) **Fertilizer Potassium kgha^{-1}** (5.51 x Targetted yield qha^{-1}) - (0.13 x Soil Phosphorus kgha-1)- (0.89 x FYM)
8	For obtaining higher yield and monetary returns of rainfed bt-cotton and improvement in soil fertility, application of fertilizer dose of 90:45:45 (N, P2O5 and K2O) kg ha^{-1} is recommended.
9	It is recommended to apply 125 % RDF i.e. 125:62.5:62.5 kg NPK per hectare through fertigation

	scheduled as 15 % NPK (1-10 DAT), 50 % NPK (11-35 DAT) and 35 % NPK (36-60 DAT) in 12 splits at 5 days interval as mentioned belowfor obtaining maximum growth, yield, better quality of broccoli with higher net monetary returns.

Split No	Days after planting	Water soluble fertilizers to be applied through drip irrigation (Kg/ha)		
		N	P	K
1	5	9.37	4.68	4.68
2	10	9.37	4.68	4.68
3	15	12.5	6.25	6.25
4	20	12.5	6.25	6.25
5	25	12.5	6.25	6.25
6	30	12.5	6.25	6.25
7	35	12.5	6.25	6.25
8	40	8.75	4.37	4.37
9	45	8.75	4.37	4.37
10	50	8.75	4.37	4.37
11	55	8.75	4.37	4.37
12	60	8.75	4.37	4.37
	Total	125	62.5	62.5

10	For obtaining better growth, yield, quality and higher monetary returns from hybrid watermelon grown on 30 micron plastic mulch, it is recommended to apply 80 % of irrigation water requirement along with 250:125:125 kg NPK/ha in 20 equal splits i.e. 12.5:6.25:6.25 kg NPK/ha per split at four days interval through drip fertigation.
11	For obtaining more monetary returns, higher yield and quality fruits of banana, fertilizer dose of 200:40:200 g NPK/plant through soluble fertilizers in 16 equal split (12.50: 2.50: 12.50 g NPK/plant) through drip irrigation at fifteen day intervals is recommended for Vidarbha region.
12	It is recommended to use drip fertigation with fertilizer level of 125 % RDF (i.e. 188:94:94 N:P_2O_5:K_2O kg ha^{-1}) to be applied in 15 splits at an interval of 10 days (half dose in first 6 equal splits and remaining half dose in 9 equal splits) and 80 % replenishment of ET_c along with silver polyethylene mulch, to obtain higher yield of brinjal and benefit cost ratio.
13	For obtaining higher fruit yield, good quality and higher monetary return of bottle gourd application of 150:75:75 N, P_2O_5 and K_2O through fertigation (in ten equal split doses at ten days interval) along with two foliar spray of $FeSO_4$ + $ZnSO_4$ @ 0.25 % each at flower initiation and fruit set is recommended.
14	In cotton based inter cropping system for obtaining higher seed cotton equivalent yield, monetary returns and to improve the soil fertility status, it is recommended the intercrops combination of paired row cotton (Two rows) + two rows of greengram (60-120-60 cm) under rainfed condition.
15	Sowing of soybean varieties PDKV Yellow Gold, Suvarn Soya and PDKV Amba by dibbling method with spacing of 45 x10 cm is recommended for getting higher yield and monetary returns.
16	For getting higher yield and monetary returns, sowing of soybean varieties PDKV Yellow gold, Suvarn soya and PDKV Amba with seedrate of 62.5 $kgha^{-1}$ (minimum 70% germination) is recommended.
17	Under fertigation in maize for higher grain yield, effective weed management and net returns it is recommended to apply 125 per cent recommended dose of nitrogen and potassium (150 kg N & 75 kg K_2O) in five splits through drip and phosphorous (75 kg P_2O_5) as basal through soil application along with pre-emergence application of atrazine 50% WP @ 0.50 kg/ha (1 kg/ha commercial product) fb post emergence application of topramezone 33.6% SC @ 0.0252 kg/ha (75 ml/ha commercial product) at 25 DAS as per following schedule.

Fertigation schedule								**Herbicide schedule**			
NK splits (%)	Stage of crop	NK dose (kg/ha)			Fertilizer (kg/ha)			Herbicide	Crop stage	a.i. (kg/ ha)	Formulation (kg/ha)
		N	K_2O	P_2O_5	Urea	MOP	SSP				

10%	Basal	15.0	7.50	Basal 75 kg/ha	32.5	12.5	Basal 468 kg/ha	Atrazine 50% WP	Next day of sowing	0.50	1.00
20%	20 DAS	30.0	15.00		65.0	25.0					
25%	40 DAS	37.5	18.75		81.2	31.2		Topramezone 33.6% SC	25 DAS	0.0252	75 ml
25%	60 DAS	37.5	18.75		81.2	31.2					
20%	80 DAS	30.0	15.00		65.0	25.0					
Total		150	75	75	325	125	468				

18	In organic farming intercrop rotation of Blackgram + Finger millet (2:1) or Blackgram + Barnyard millet (2:1) in kharif season followed by Chickpea + Ajwain (2:1) or Chickpea + coriander (2:1) in rabi season for getting higher sustainable yield, monetary returns and soil health improvement. For nutrient management, seed treatment with bio-fertilizers, application of 2 tonne vermicompost and 300 kg phosphorous rich organic manure per hectare for both seasons and for pest management, spraying of botanicals (Dashparni ark 250 ml. in 10 lit. of water and 5% NSE) is recommended.
19	In organic Rice, seed treatment with *Azospirillum*, PSB and Trichoderma in nursery and application of vermicompost 5 t ha^{-1} + phosphorous rich organic manure (PROM) 200 kg ha^{-1} in soil before puddling of Sunhemp green manuring for getting sustainable yield, monetary returns and improving soil fertility and for pest management, use Trichocard @ 5 cards/ha 4 times and spraying with 5% NSKE or Dashparni Ark 250 ml/10 liter water and bio-pesticide, *Verticillium lecanii and Metarhizium anisopliae* @ 40 ml/10 liter water is recommended.
20	For light to medium soils of Vidarbha region, custard apple plant spacing 4 m x 2.5 m (1000 plants/ha) with the medium pruning in second fortnight of May and 40 to 60 fruits retention per plant is recommended for obtaining the quality fruit yield and higher economic returns.
21	For early and higher seed germination with better seedling growth of charoli, pre-sowing seed treatment of physical scarification (seed coat slightly cracking) followed by seed soaking in GA_3 300 ppm for 24 hrs is recommended.
22	In Vidarbha region in fruit crop based intercropping system for getting more productivity from unit area it is recommended to grow turmeric variety PDKV Waigaon as intercrop in aonla orchards.
23	For production of quality citrus grafts and obtaining higher economic returns, covering of root stock by used fertilizer bag strip or black polyethylene tape instead of traditional method of removal of unwanted side shoots on root stock is recommended.
24	For obtaining better growth, yield, quality and higher monetary returns from hybrid green chilli grown on 30 micron plastic mulchinrabiseason, it is recommended to use 17 GSM non–woven white colour crop covers upto 45 days after transplanting.
25	In Vidarbha region to take production in kharif season by planting set onion it is recommended to sow seed on raised bed at the rate of 4 gm/m^2 in first week of February and these ready set to plant in second week of July at spacing of 15 X 15 cm.
26	For better germination and commercial propagation of Adenium, seeds soaking in GA_3 200 ppm concentration for 12 hrs and sowing in Sand + FYM (1:1) proportion is recommended
27	For commercial propagation and better germination of Royal Palm seeds soaking in GA_3 1500 ppm concentration for 24 hours before sowing is recommended.
28	For early rooting, better vegetative growth and commercial propagation of Semi-Hardwood cuttings of Ixora, treatment with IBA 2000 ppm concentration for 30 minutes is recommended.
29	Sowing of Shatavari on Ridges and furrow at 60 X 30 cm spacing with application of 5 t/ha FYM is recommended for dry root yield and net monetary return.
30	For preparation of value added Mahua burfi, it is recommended to use 25% crushed dried mahua flowers and 30% sugar to the weight of cow milk khoa.
31	For preparation of guava toffee having storability ninty days, guava pulp : sugar: butter : skim milk

	powder (1: 1: 0.1 : 0.1) proportion is recommended .
32	For preparation of quality lime blended mandarin marmalade (TSS 65^0B) eatable up to three months, 55 % Nagpur mandarin juice + 5 % lime juice + 6.2 % Nagpur mandarin peel shreds is recommended.
33	For maintaining the quality of custard apple fruits during distance transportation and longer shelf life, fruit wrapping with foam net and placed in ventilated corrugated boxes along with 2 sachets of 1 g ethylene absorbent is recommended.
34	For seed treatment application of 25g/kg seed of GAKPR-16 as a biofertilizer should be applied for maximum yield of pigeon pea is recommended.
35	For getting higher yield of linseed and for effective management of powdery mildew disease, seed treatment with salicylic acid 50 PPM (50mg/kg seed) + two foliar spray of salicylic acid at 50 PPM (50 ml/l) at 30 and 45 DAS or 2 foliar spray of hexaconazole (0.1%) as soon as disease is appeared in the field and 2nd spray after 10 days interval if required is recommended
36	It is recommended that the occurrence of Alternaria blight disease in tomato crop can be predicted 14 days in advance by the following equation. The resulting – ve value will indicate absence of disease and + ve value will indicate possibility of occurrence of disease. Log_{10} Y = -19.6566 + (8.5456*Log_{10}X0**) + (0.0166*Log_{10}X1**) + (5.9282*Log_{10}X2**) + (-0.2453*Log_{10}X3**) + (-1.9385*Log_{10}X4**) + (1.2068*Log_{10}X5**) – 0.596 Here, Y = Disease intensity X0 = Meteorological Week X1 = Rainfall (mm) X2 = Maximum Temperature (ºC) X3 = Minimum Temperature (ºC) X4 = Morning Relative Humidity (%) X5 = Evening Relative Humidity (%) ** = Significant at 1% level of significance.
37	Post harvest treatment of 1000 ppm Neomycine and 1000 ppm Fluconazole used in combination for treatment of Nagpur mandarin fruits can restrict green mold (*P. digitatum) &* sour rot (*G. candidum)* diseases under ambient storage upto 15 days.
38	For management of leaf miner pest in Nagpur Mandrin nursery, spraying of neem seed extract @ 5% at 30 days after bud sprouting followed by Imidacloprid 17.8 % SL @ 2.5ml /10 L water at pest initiation is recommended
39	For assessment of stem fly and girdle beetle infestation (% plant infestation) as well as to determine the % stem tunneling due to these stem tunnellers, for research workers (10 plants / 10 m^2 plot area) and such 5 spots per field (4 spots from 4 corners of the field 10 meter inside and 1 spot in the center of the field) for field diagnosis for extension workers is recommended.
40	It is recommended that, the dugout type farm pond constructed on farmers field should have the existing bund (1.5 m height) or grown the vegetative barrier (1.3 -1.5 m height) around the farm pond to save the storage losses up to 27.97 percent.
41	In dryland agriculture, for Western Vidarbha Zone on medium deep black soil having average slope of 1%, it is recommended that from 1.0 ha catchment area on an average 457m^3 runoff was stored in the farm pond which can be utilized to irrigate about 0.91 ha area during *kharif* or *rabi* season with one protective irrigation of 5 cm depth.
42	It is recommended to use Dr. PDKV developed weekly mean reference evapotranspiration for determining water requirement of different crops for all tahsils of Vidarbha. Similarly, it is recommended to use maps developed in GIS for determining mean reference evapotranspiration of specific week at specific location.
43	PDKV developed process technology for the production of nutria-snack product, prepared with 1 kg blend ratio of sorghum, corn and proso millet (60:30:10) with powder of 5g ashwagandha, 9g ginger, 2g of gudwel and 2g of drumstick leaves at 15% moisture content having 90 days storage life is recommended.
44	PDKV developed processing machinery under Value Chain on Pulses is recommended for

	processing of pulses, preparation of different value added products and employment generation.
45	**"**PDKV UV-Assisted Treatment Device" developed for Nagpur Mandarins is recommended for treatment of Sweet Orange fruits after reducing RPM (10 rpm) of conveyor belt, to provide 5 min Pre-wax UV-C (254 nm) exposer followed by 10% edible wax coating without fungicide for post harvest decay control under ambient storage conditions.
46	It is recommended to use PDKV developed multi-tier hydroponic structure with Nutrient Film Technique of size 2 x 1.1 x 3 m made up of PVC pipe (75 mm) and UPVC pipe (25 mm) for cultivation of leafy vegetables**.**
47	It is recommended to use PDKV developed Low Cost Portable Onion Storage Structure with 15 q capacity for storage of rabi onions up to 150 days.
48	It is recommended to use puf roof for reducing the inside temperature of poultry house structure (2x1.1x 3 m).
49	PDKV developed Gas Evolved Device is recommended for the quality detection during fruits and vegetables storage**.**
50	Due to Soil Health Card programme it is observed that, there was 15.92 per cent increase in productivity, 16.92 per cent increase in income and overall impact was 16.03 per cent on the paddy growers. It is therefore, recommended that, Soil Health Card Programme should be effectively implemented for longer period through extension functionaries.
51	It is observed that there was 21.45 per cent increase in area of PKV-Tara on paddy bunds in Eastern Vidrbha Zone. Therefore, it is recommended that, the extension agency should encourage the sowing of pigeon pea on paddy bunds on large scale in paddy area.
52	Due to adoption of sprinkler irrigation scheme implemented through PoCRA, the area under irrigation for rabi gram crop has been increased by 41.17 per cent, productivity increased by 40.49 per cent and annual income increased by 25.04 per cent. It is therefore recommended that for more effective adoption of sprinkler irrigation method in saline track of Vidrbha region, the extension agency should encourage for maximize farmer participation.
53	From the study on constraints faced by shed net growers in cultivation of vegetable crops, it is observed that there is frequent damage of shed net structure and crops grown in shed net due to natural calamities. It is therefore recommended that Government should make provision of insurance for shed net structure to mitigate the losses due to natural calamities.
54	Cotton productivity has been increased 30 per cent by adoption of IPM recommended technology. Therefore, it is recommended that, the IPM technology promoted and disseminated through the extension agencies for wide adoption.
55	The area under groundnut crop in Nagpur district has been steadily decreasing by 9.81 per cent per annum during the last two decades. Losses of groundnut crop mainly due to attack of wild animals was found to be responsible for the reduction in the area. Hence ,it is recommended that the forest department should take appropriate measures to prevent the damage caused by the wild animals to the crop.
56	Based on the results of crop concentration and diversification in Western Vidarbha region the area and production of Jowar and Bajara has decline continuous during last three decades by 9.84, 12.73 per cent and 11.05, 9.62 per cent per annum respectively. It is therefore recommended that, more concentration to increase the area under these crops.
57	In Eastern Vidarbha Zone due to B:C ratio realised by the farmers adopting drilled paddy based gram cropping system(1:1.58), drilled paddy-linseed (1:1.35) and drilled paddy-lathyrus (1:1.26) are found economically feasible. Hence all the three drilled paddy based system are recommended as per availability of resources with the farmer.
58	Considering the maximum cry gene frequencies and higher insecticidal toxicities of PDKV SY-4, PDKV - SA-6 and PDKV - SGd-1, while at par toxicities and cry gene frequencies recorded for PDKV-SA-18, PDKV-SA-20, PDKV-SAK-6, PDKV-SAK-9, PDKV-SGn-4, PDKV-SGn-5, PDKV-SBn-2, PDKV-I-3 strains than the reference *Bt* strain HD-1, it is recommended that all these 11 PDKV *Bacillus thuringiensis* strains be registered in the group of useful microorganisms and further may be used in plant protection studies.