Recommended Technlogies-2019

Mahatma Phule Krishi Vidyapeeth, Rahuri, Dist. Ahmednagar hosted the Joint Agricultural Research Committee Meeting (JOINT AGRESCO) in the month of May 2019. The details of crop varieties and implement released along with specific recommendations on production technology, rain water management, value addition based on research work are as under,

Release of Variety:

Parbhani Super Moti : (SPV 2407)

A dual purpose *rabi* sorghum variety "Parbhani super Moti (SPV 2407)" recorded higher grain and fodder yield over the national and local checks. It was found moderately tolerant to shoot fly, stem borer and charcoal rot. Hence, the variety "Parbhani Super Moti (SPV 2407)" is recommended for cultivation in Marathwada region.

Implements Released :

1. VNMKV developed bullock drawn MPTC for planter cum solar sprayer is recommended for planting, seed covering , fertilizer application , inter culture operations and spraying of insecticide or pesticide.
2. VNMKV developed bullock drawn mulch laying machine is recommended for making bed (Width 90 -120 cm , height 12-15 cm), laying and covering of plastic mulch.
3. VNMKV developed Bullock drawn cotton planter cum fertilizer drill is recommended for planting of cotton, fertilizer application, marking and covering of seed simultaneously.
4. VNMKV developed Bullock Drawn Turmeric Interculture cum earthing up Implement is recommended for inter-culturing and simultaneously earthing up in turmeric crop.
5. VNMKV developed tractor operated Rotary interculturing tools is recommended for wide spaced grown crops.
6. VNMKV developed Mini-Manual Boom Sprayer (MMBS) is recommended for spraying in all crops
7. VNMKV developed High Temperature Short Time (HTST) type puffing cum popping machine (capacity 40 to 50 kg/hr) is recommended for the production of *kharmure* (soybean, peanuts), *Phutane* (Bengal gram). Sorghum pops and popcorn.

Agronomy

1. For obtaining higher yield and net profit, planting of pigeon pea on Broad Bed Furrows (BBF) at 1.5m with two row on the bed at 90 cm along with foliar application of Mepiquat chloride @100 ppm at 50 % flowering and integrated nutrient management with 5 tonnes of FYM ha^{-1}, seed treatment of each *Rhizobium* and PSB@ 100ml / 10 kg of seed along with 50% RDF (12.5 : 25: 12.5 NPK kg/ha) is recommended for Marathwada region.
2. For maximizing productivity and net monetary returns, sowing of chickpea either on ridges and furrows or broad bed furrows (BBF) along with protective irrigations (60 mm depth) at branching and pod development stage are recommended.

Variety and Implements Released

Rabi Sorghum : Parbhani Super Moti : (SPV 2407)

Bullock Drawn Plant cum Solar Sprayer

Bullock Drawn Mulch Laying Machine

Bullock Drawn Cotton Planter cum Fertilizer Drill

Bullock Drawn Turmeric Interculture cum Earthing up Implement

Implements Released

Tractor Operated Rotary Interculturing Tool

Mini Manual Boom Sprayer

Puffing cum Popping Machine

Crop

3. Recommendation of forewarning model for extension workers and scientists to forewarn peak leaf hopper infestation on *Kharif* groundnut crop and age of the groundnut crop (DAS) at peak leaf hopper infestation for Marathwada region.

   A) Model for peak leaf hopper infestation on groundnut crop

   (Y) = 30.42999 + 0.34890* Z41

   B) Model for age of groundnut crop at peak infestation of leaf hopper

   (Y) = 54.8567 + 0.00388* Z151 + 0.11952*Z231 + 0.00496* Z230

   Where,

   Z41 = 4-Evening humidity, 1-Weighted interaction : Weighted interaction of leaf hopper& evening relative humidity

   Z151 = 1-Max. temperature, 5-Rainfall, 1-Weighted interaction : Weighted interaction of maximum temperature & Rainfall

   Z231 = 2-Min. Temperature, 3-Morning humidity, 1- Weighted interaction :
   Weighted interaction of minimum temperature & morning relative humidity

   Z230 = 2-Min. Temperature, 3-Morning humidity, 0-Unweighted interaction :
   Unweighted interaction of minimum temperature and morning relative humidity

   (1 = Max. temperature, 2= Min. Temperature, 3= Morning humidity, 4 = Evening humidity, 5 = Rainfall & last 0, 1 represents unweighted, weighted interactions respectively)

* Weights being correlation coefficients between variable to forecast and weather variable taken one or two in 27th to 32nd SMW.

4. Recommendation of forewarning model for extension workers and scientists to forewarn peak leaf miner infestation on *kharif* groundnut crop and age of groundnut crop (DAS) at peak leaf miner infestation for Marathwada region.

   A) Model for peak Leaf miner infestation on groundnut crop

   (Y) = 31.67182 + 0.01079*Z121 + 0.00865*131 + 0.00208*Z251.

   B) Model for age of groundnut crop age at peak infestation of leaf miner

   (Y) = 33.75243 + 0.0769*Z131

   Where,

   Z121 = 1- Max. temperature, 2- Min, temperature, 1- Weighted interaction
   : Weighted interaction of max. temperature& min. temperature

   Z131 = 1- Max. temperature, 3- Morning humidity, 1- Weighted interaction
   : Weighted interaction of maximum temperature & morning relative humidity.

   Z251 = 2- Min. temperature, 5- Rainfall, 1- Weighted interaction
   : Weighted interaction of Min. temperature and Rainfall

* Weights being correlation coefficients between variable to forecast and weather variable taken two or one at a time in 27th to 32nd SMW.

5. For achieving higher productivity and monetary returns, soil application of *Trichoderma viride* @ 2.5 kg/ha through FYM (Tv-TNAU), seed treatment with *Pseudomonas fluorescence* (CICR) @ 10 g/kg of seed and foliar spray of copper oxychloride 0.3% + Streptocycline 0.01% is recommended after 45 DAS for management of wilt / root rot, bacterial blight, alternaria and grey mildew disease incidence in Bt cotton.

Agri. Engineering :

6. Rainfall Intensity constants be estimated every after 5 years for Aurangabad, Buldhana and Parbhani, respectively every after 10 years for Akola and every after 15 years for Amravati stations.
7. The reference evapotranspiration estimated by Penman - Monteith (FAO-56) method in table 1 is recommended for irrigation planning and scheduling.

MW	ETo (mm/day)	MW	ETo (mm/day)	MW	ETo (mm/day)	MW	ETo (mm/day)
1	4.2	14	9.2	27	5.7	40	4.3
2	4.4	15	9.5	28	5.1	41	4.5
3	4.7	16	10.3	29	5.0	42	4.9
4	4.9	17	10.5	30	4.7	43	4.9
5	5.3	18	11.5	31	4.4	44	5.0
6	5.6	19	11.8	32	4.4	45	4.8
7	6.0	20	12.0	33	4.4	46	4.6
8	6.4	21	12.6	34	4.3	47	4.4
9	7.1	22	11.7	35	4.2	48	4.0
10	7.4	23	9.3	36	4.3	49	4.3
11	7.7	24	7.7	37	4.4	50	4.2
12	8.5	25	6.9	38	4.5	51	4.2
13	8.7	26	6.3	39	4.2	52	4.1

8. The crop coefficients given in table 1 and 2 are recommended for estimation of water requirement of *Bt* Cotton, Pigeon pea, Soybean, Safflower, Wheat and Gram under Parbhani Condition and alternative these polynomial equations given in table 3 are recommended for estimation of water requirement.

Table 1 : Crop Coefficients for Bt Cotton, Pigeon pea and Soybean for the week after Planting/sowing

Bt. Cotton			Pigeon pea			Soybean		
MW	WAP	Modified Kc	MW	WAP	Modified Kc	MW	WAS	Modified Kc
25	0	0.59	25	0	0.59	26	0	0.63
26	1	0.62	26	1	0.62	27	1	0.62
27	2	0.62	27	2	0.62	28	2	0.62
28	3	0.62	28	3	0.62	29	3	0.63
29	4	0.54	29	4	0.65	30	4	0.71
30	5	0.61	30	5	0.67	31	5	0.85
31	6	0.7	31	6	0.68	32	6	1.02
32	7	0.81	32	7	0.73	33	7	1.2
33	8	0.9	33	8	0.78	34	8	1.26
34	9	0.99	34	9	0.82	35	9	1.26
35	10	1.07	35	10	0.89	36	10	1.16
36	11	1.14	36	11	0.95	37	11	0.93
37	12	1.21	37	12	1.03	38	12	0.63
38	13	1.23	38	13	1.07	39	13	0.50
39	14	1.26	39	14	1.13			
40	15	1.3	40	15	1.20			
41	16	1.31	41	16	1.23			
42	17	1.32	42	17	1.26			
43	18	1.3	43	18	1.25			
44	19	1.28	44	19	1.22			
45	20	1.23	45	20	1.15			
46	21	1.17	46	21	1.05			
47	22	1.1	47	22	0.92			
48	23	1.04	48	23	0.77			
49	24	0.98	49	24	0.63			
50	25	0.92	50	25	0.33			
51	26	0.87	51	26	0.23			
52	27	0.82						
1	28	0.76						
2	29	0.76						
3	30	0.79						

MW : Meteorological week :

WAP : Weeks after planting :

WAS : Weeks after sowing

Table 2 : Crop coefficient for Safflower, Wheat and Gram for the week after planting / sowing

Safflower			Wheat			Gram		
MW	WAS	Modified Kc	MW	WAS	Modified Kc	MW	WAS	Modified Kc
43	0	0.62	48	0	0.60	43	0	0.62
44	1	0.62	49	1	0.60	44	1	0.62
45	2	0.61	50	2	0.76	45	2	0.61
46	3	0.60	51	3	0.90	46	3	0.54
47	4	0.45	52	4	1.03	47	4	0.64
48	5	0.52	1	5	1.09	48	5	0.74
49	6	0.61	2	6	1.15	49	6	0.87
50	7	0.71	3	7	1.18	50	7	1.01
51	8	0.83	4	8	1.22	51	8	1.1
52	9	0.95	5	9	1.25	52	9	1.13
1	10	1.03	6	10	1.29	1	10	0.99
2	11	1.11	7	11	1.30	2	11	0.94
3	12	1.15	8	12	1.28	3	12	0.71
4	13	1.14	9	13	1.20	4	13	0.46
5	14	1.07	10	14	1.02	5	14	0.35
6	15	0.96	11	15	0.76	6	15	0.35
7	16	0.79	12	16	0.33			
8	17	0.48	13	17	0.15			
9	18	0.31	14	18	0.14			
10	19	0.20	MW : Meteorological Week;					
11	20	0.18	WAS : Weeks after sowing					

Table 3 : Crop wise Polynomial equations for deriving crop coefficient

Sr. No.	Crop	Polynomial Equation
1	Bt. Cotton	$Y = 0.303\ (t/T)^5 + 17.54(t/T)^4 + 36.01\ (t/T)^3 + 21.52(t/T)^2 - 2.620(t/T) + 0.651$
2	Pigeon Pea	$Y = 14.03(t/T)^5 - 38.73(t/T)^4 + 30.72(t/T)^3 - 7.368(t/T)^2 + 0.964(t/T) + 0.583$
3	Soybean	$Y = 35.84\ (t/T)^5 - 84.10(t/T)^4 + 61.29(t/T)^3 - 14.04(t/T)2 + 0.953(t/T) + 0.616$
4	Safflower	$Y = 57.66(t/T)^5 - 130.9(t/T)^4 + 93.58(t/T)^3 - 21.82(t/T)^2 + 1.156(t/T) + 0.615$
5	Wheat	$Y = 10.39(t/T)^5 - 29.20(t/T)^4 + 25.15(t/T)^3 - 10.06(t/T)^2 + 3.294(t/T) + 0.515$
6	Gram	$Y = 39.50(t/T)^5 - 84.53(t/T)^4 + 53.90(t/T)^3 - 9.204(t/T)^2 + 0.055(t/T) + 0.631$
Here : Y : Crop Coefficient, t = Days after sowing / planting, T = Crop Period		

Food Technology:

9. It is recommended that good quality watermelon rind candy can be prepared by using 2% $CaCl_2$ with different flavours and dried in cabinet dryer at 50^0C temperature for 6 h time.
10. It is recommended that good quality acceptable probiotic *Shrikh and* can be prepared by adding 0.75 per cent Psyllium husk and 2 per cent lactic acid bacteria.
11. Good quality of nutra *laddu* prepared by using linseed (40%), popped amaranth (20%), jaggrey (30%), honey (10%) and guar gum (0.3%) is recommended.
12. For the preparation of good quality, fresh turmeric rhizome-based orange RTS beverage, the addition of 10 percent fresh turmeric rhizome juice in 90 per cent orange juice is recommended.
13. The use of bael fruit pulp and aonla fruit pulp in 50:50 proportions with addition of 30 per cent sugar and 0.5 per cent citric acid is recommended for the preparation of good quality mixed fruit leather. The aluminium foil packaging is recommended for its better storage.
14. For the preparation of good quality, acceptable natural jamun bar, utilization of only pulp is recommended. The shelf life of prepared jamun bar was six months with packaging in aluminium foil at room temperature.
15. Nutritious, green coloured fenugreek noodles prepared with addition of 30g fenugreek puree per 100g of refined wheat flour is recommended.
16. The antinutritional factor Saponin, in Quinoa seeds can be significantly reduced by soaking the seeds in 2% citric acid solution for overnight. Cookies can be prepared by using 40% Quinoa flour with better nutritional and sensorial properties.

Home Science

17. VNMKV prepared folder on Growth quotient assessment of children & its multiple benefits and the School age children's developmental milestones check list are recommended for parents, teachers and child care professionals to make use it for care and development of school age children.
18. It is recommended that VNMKV Parbhani developed *Lentflaxmix* utilizing lentil 38%, flax seeds 25% , groundnuts 12% , gingelly seeds 7%, cumin seeds1%, coriander1%, cooking oil 16% and salt and *Kastapuri* prepared with wheat flour 38%, barnyard millet flour 22% , bengal gram dal flour 20%, omum 0.5%, drumstick leaves powder 1.5% , cooking oil 18% and salt had low glyceamic index value. Hence, these snacks can be used by the diabetic subjects.
19. It is recommended that deoild coconut meal can be utilized for preparation of value added bakery products viz. Cookies and *Nankatai*. There is increase in the protein, minerals, fiber, calcium and iron content in Cookies with 20 per cent and in *Nankatai* with 35 per cent in corporation of deoild coconut meal. Hence, these products will be beneficial for growing children, adolescents, pregnant women, lactating mothers, old people and underweight individuals.
20. VNMKV developed Low Glycemic Index products viz Mix Pulse Roll (GI 36.96), Millet Namkeen (GI 34.53), Millet Mix (GI 30.22), Multigrain Roti (GI 39.77) and *Khichadi* (GI 40.90) are recommended in the daily diet plan of diabetic people.
21. It is recommended that VNMKV, Parbhani developed Pearl Pop snack consumed 50g daily for a period of 60 days will be helpful to increase the level of haemoglobin.
22. VNMKV low cost technology basket consisting of seven technologies (viz. digging tool, earthing up tool, finger guards, new *khurpi,* hand wears, wooden rake & fertilizer bag) is recommended for drudgery mitigation of farm women in turmeric production system.

23. VNMKV developed sapling carrier is recommended for transplanting with hand lever operated trans-planter for drudgery reduction of the farm women.
24. It is recommended that eco-friendly; multipurpose textile fibers can be extracted from dry corn husk.

Soil Science

25. It is recommended that very shallow soils (20-25 cm), silty clay loam, underlined by medium hard to hard murrum layer soils (Entisols) are to be selected for higher production of custard apple.

Dry land Agriculture

26. The value of exponent 'm' in Modified Universal Soil Loss Equation (MUSLE) for Parbhani station is recommended as 0.50. On this basis, the following VNMKV developed model (equation) is recommended for estimation of soil loss from small agricultural fields.
    $S = 11.8 (Q \times q)^{0.50} KLSCP$

Extension Education

27. It is recommended that extension functionaries such state department of agriculture, University's extension system, KVKs etc. should create awareness among the farmers about use of various mobile apps developed by VNMKV, Parbhani.
28. The favourable attitude among agricultural students towards entrepreneurship can be converted into successful entrepreneur by organising various courses, training, hands-on training, seminars and workshops etc by inviting agribusiness practitioners, other professionals. Establishment of business Incubation centre at University level is recommended.
29. It is recommended that through various extension agencies viz. State Agriculture Department State Agricultural Universities, *Krishi Vigyan Kendra* etc. training to be organized on use of Soil health card and as per recommendations how to calculate fertilizer doses for effective use of soil health card.
30. Construction of farm pond had increased in sustainable crop productivity, protective irrigation and initiation in cultivation of horticultural crop. It is recommended that various extension agency viz. State department of Agriculture, Universities and *Krishi Vigyan Kendra* to make efforts for horizontal spread of construction of farm pond among farmers.

Economics

31. In Parbhani and Latur markets, short run disequilibrium in chickpea prices was observed, so it is recommended that to attain the short run equilibrium in chickpea prices quick and live price dissemination system may be developed by Agricultural produce Market Committee.
32. It is recommended that the efforts may be made to disseminate improved pigeon pea production technology through extension agencies to improve the productivity levels particularly in Parbhani and Nanded districts.

Technologies Recomended

Pigeon Pea Planting on BBF

Spraying in Bt Cotton

Gram Sowing on BBF

Watermelon Candy

Probiotic *Shrikhand*

Technologies Recomended

Nutra Laddu using Linseed, Popped Amaranth, Jaggery, Honey and Guar Gum

Turmeric Rhizome based Orange Beverage

Mixed Fruit Leather

Nutritious Fenugreek Noodles

Mixed Pulse Roll

Sapling Carrier for Transplanting