On-Farm Trials

On-Farm Trials is important mandate of Krishi Vigyan Kendra Hanumangarh-1, the performance of proven technologies trials in real farm situations on farmer's fields.Directly with farmers under the close supervision of scientists, so that farmers can see the results for themselves.

- **Participatory Approach** – conducted with farmers on their own fields.
- **Problem-Oriented** – aims to solve locally relevant production constraints related to major crops/ Livestock.
- **Technology Assessment** – research recommendations to suit local agro-climatic conditions.
- **Data-Based** – yield, cost, returns, and farmers' feedback are recorded.
- **Technology Assessment**– focuses on validation by KVK before large-scale dissemination.

Steps in Designing OFTs

1. **Identify Problems:**
    - Through PRA, diagnostic visits, surveys, and farmer discussions.
2. **Select Technologies:**
    - From research institutions/SAUs/ICAR recommendations.
3. **Prepare Trial Design:**
    - Treatments:
        - **T1:** Farmer's practice (Local Check)
        - **T2:** Recommended practice / Improved technology
        - Additional treatments if needed
4. **Conduct Trials:**
    - On selected farmers' fields with proper record-keeping.
    - Provide necessary inputs and guidance.
5. **Collect Data:**

- Growth, yield, disease/pest incidence, economics (Cost of Cultivation, Gross Returns, B:C ratio).

6. **Analyze Results:**
   - Compare performance with local check.
   - Compute **% increase in yield**, net returns, **B:C Ratio,** additional information if required and farmer feedback.
7. **Disseminate Results:**
   - Organize field days, prepare reports, and share with researchers and farmers.

Purpose of On-Farm Trials

- To **refine and verify technologies** before large-scale recommendation.
- To ensure **location specificity** of recommendations.
- To increase **adoption rate** by involving farmers directly in the process.
- To bridge the gap between **KVK/Research station results** and **farmer field reality**.

OFT conducted by KVK Hanumangarh-1

TECHNICAL ACHIEVEMENTS 2021

3.A. Details of target and achievements of mandatory activities by KVK during 2021

OFT (Technology Assessment)				FLD (Oilseeds, Pulses, Cotton, Other Crops/Enterprises)			
1				2			
Number of OFTs		Total no. of Trials		Area in ha		Number of Farmers	
Targets	Achievement	Targets	Achievement	Targets	Achievement	Targets	Achievement
10	09	100	90	200 ha	191.7 ha &144nos	700	667

Training (including sponsored, vocational and other trainings carried under Rainwater Harvesting Unit)					Extension Activities			
Number of Courses			Number of Participants		Number of activities		Number of participants	
Clientele	Targets	Achievement	Targets	Achievement	Targets	Achievement	Targets	Achievement
Farmers	30	33	1200	1184	450	439	28000	27815
Rural youth	10	11	350	380				

Extn. Functionaries	5	6	200	182				

Seed Production (Qtl.)			Planting material (Nos.)		
5			6		
Target	**Achievement**	**Distributed to no. of farmers**	**Target**	**Achievement**	**Distributed to no. of farmers**
	110.06	369	70000	66533	4047

I.A TECHNOLOGY ASSESSMENT 2021

Summary of technologies assessed under various crops by KVKs

Thematic areas	Crop	Name of the technology assessed	No. of trials	No. of farmers
Integrated Nutrient Management	Wheat	Demand driven need-based fertilizer N application through LCC.	1	10
	Kinnow	Foliar spray of nutrients at fruit developing stage in kinnow.	1	10
	Onion	Foliar spray of micronutrients at bulb developing stage in onion	1	10
Integrated Pest Management	Sorghum	Chlorantraniliprole 18.5% SC @ 0.40 ml/lit for stem borer Management in sorghum fodder crop.	1	10
	Tinda	Emamectin benzoate 5% SG @ 0.4 gm/lit. water for thrips management in Tinda.	1	10
Integrated Disease Management	Kinnow	Sodium Hypochlorite 5% for gummosis management in kinnow.	1	10
Resource Conservation Technology	Chickpea	Use of liquid Bio-fertilizers in Gram crop.	1	10
Total			**7**	**70**

Summary of technologies assessed under livestock by KVKs

Thematic areas	Name of the livestock enterprise	Name of the technology assessed	No. of trials	No. of farmers
Nutrition Management	Milk producton		1	10
	Milk producton	Balance feeding with chelated mineral mixture in buffalo	1	10
Total			**2**	**20**

Summary of technologies assessed under various enterprises by KVKs

Thematic areas	Enterprise	Name of the technology assessed	No. of trials	No. of farmers

TECHNOLOGY ASSESSMENT IN DETAIL

INTEGRATED NUTRIENT MANAGEMENT

1.

Problem definition: Non judicius use of N fertilizers. (1st year)

Technology Assessed: Demand driven need-based fertilizer N application through LCC**.**

Wheat is the prime crop of Hanumangarh district.As we know the nitrogen is one of the major plant nutrients which govern the proper growth of plants, its judicious and optimum application is must.Non judicious application of nitrogen causes nutrient imbalance and increases the susceptibility of plants to pests and diseases. This is not onlyresponsible for higher cost of production but also causes environmental pollution.Therefore, demand driven need-based fertilizer N application through LCC can help efficient nitrogen management in wheat crop.For this purpose, an OFT was conducted and found that the difference in yield of T_1 and T_2 was found to be non-significant. There was not much difference in the amount of nitrogen used by the farmer and the amount of nitrogen used with the help of leaf color chart.

Table: Performance of technology in reference of yield and income of Wheat.

Technology Option	No. of trials	Yield (q/ha)	Increase in yield (%)	Net Returns (Rs./ha)	B:C Ratio
Farmer's Practice	10	46.89	-	78949	3.62
Leaf Color Chart (LCC) based nitrogen management(Assessment)		47.05	0.34	80654	3.69

RESOURCE CONSERVATION

2.

Problem definition: Incompetence of carrier-based inoculants.

Technology Assessed: Use of liquid Bio-fertilizers in Gram crop.

Chickpea is a major pulse crop of Hanumangarh district in Rabi season. There ia a good possibility to increase its production by inoculation with Rhizobium & Phosphate solubilizing bacteria (PSB) inoculants to the seed or to the soil even in fields where chickpea have been grown for many years.

At present, Bio-fertilizers are supplied to the farmers as carrier-based inoculants. Bio-fertilizer consumption is not very satisfactory due to certain disadvantages associated with carrier-based bio-fertilizers, while liquid bio fertilizer does not have these disadvantages. Therefore, this trial was conducted.The effect of liquid and carrier-based bio-fertilizers on grain yield was significant. Higher yield was recorded with liquid bio-fertilizers (18.74q/h) over carrier-based bio-fertilizer treatment (18.00q/h) and uninoculated control (16.95q/h).

At vegetative stage, a significant increase in nodulation was observed with both liquid and carrier-based bio-fertilizers over control treatment.

Table: Performance of varieties in reference of yield and income of Chickpea.

Technology Option	No. of trials	Yield (q/ha)	Increase in Yield (%)	Net Returns (Rs./ha)	B:C Ratio	Number of nodules plant^{-1}
No use of Bio-fertilizers. (Control)	10	16.95	--	62664	3.11	12
Use of Bio-fertilizers as per recommendation (Carrier based inoculants). (RP)		18.00	6.19	71337	3.30	26
Use of liquid Bio-fertilizers (Assessment)		18.74	10.56	72202	3.42	32

PEST AND DISEASE MANAGEMENT

3.

Problem definition: Gummosis management in Kinnow.

Technology Assessed: Sodium Hypochlorite 5% for gummosis management in kinnow.

Kinnow is an important fruit crop of Hanumangarh district. The plants mainly suffer from gummosis (Foot rot) caused by *Phytophthora polmivora*. Phytophthora is most destructive pathogen of Kinnow plant and responsible for significant economic losses to orchardist. To combat this problem, we frame a work on farm trial and found that on the management of gummosis in kinnow. Farmers generally used Paste the solution of Ridomil MZ @ 2g + 100 ml linseed oil on infected trunk and branches and drenching of Redomil MZ @25 gm per plant twice in a year but is not effective to control this disease so, we design to conduct OFT on Gummosis management.Results showed that the spray of Sodium Hypochlorite 5%was found to be more effective than Ridomil MZ in the management of gummosis disease.

Table Efficacy of different pesticides for Gummosis management in Kinnow.

Technology Option	No.of trials	Recovery from trunk lesion (%)	Reduction in Phytophthora propagule density (%)	Yield (q/ha)	Spray cost per plant (Rs.)	B:C RatioRati
T_1- Paste of Ridomil MZ @ 2g + 100 ml linseed oil on infected trunk and branches and drenching of Redomil MZ @25 gm per plant twice in a year. (Farmer's practice)	10	60.03	79.16	325	113.00	4.15
T_2-Spray of Sodium Hypochlorite 5%@ 50 ml/ 10liter water on affected trunk & branches twice in a year		64.49	84.72	345	31.90	5.10

4.

Problem definition: Stem borer management in sorghum

Technology Assessed: Chlorantraniliprole18.5% SC @ 0.40 ml/lit for Stem borer management in Sorghum fodder crop.

Sorghum (Jowar) is an important fodder crop during Kharif season accounting for about 177 ha area in the Hanumangarh district 2017-18. Livestock is the main base of agriculture in Hanumangarh district. In India nearly 150 insect species have been reported as pests on sorghum

(Jotwani*et al*., 1980, Sharma, 1993), of which sorghum shoot fly (*Atherigonasoccata*), and stem borers (*Chilo partellus,)* are important pests. Stem borer, *Chilo partellus*is a common pest in sorghum fodder crop. Stem borer infestation starts about 20 days after seedling emergence, and deadhearts appear on 30 to 40 day old-crop. During the off-season, the larvae diapauses in plant stalks and stubbles. With the onset of rainy season, the larvae pupate and the adults emerge in 7 days. The first indication of stem borer infestation is the appearance of small-elongated windows in whorl leaves where the young larvae have eaten the upper surface of the leaves. Later, the plant presents a ragged appearance as the severity of damage increases. Normally, two leaves dry up as a result of stem borer damage. Larvae continue to feed inside the stem throughout the crop growth. Extensive tunneling of the stem and peduncle leads to drying up of the panicle, production of a partially chaffy panicle or peduncle breakage. *Chilo partellus*Swinhoe is regularly causing economic losses during kharifseasons. Looking the seriousness of these pests an attempt was made to gather information on pest management. The existing chemicals are not controlling the insect and farmers are incurring heavy losses of fodder yield and poor quality.

KVK, Hanumangarh-1st assessed the efficacy of Lambda Cyhalothrin 5% EC @ 1.5 ml/lit., Chlorantraniliprole18.5% SC @ 0.40 ml/lit. andTricogrammachilonis 2.5lac egg parasite per ha two time use at one-weekintervealagainst stem borer management in sorghum at ten different locations of Hanumangarh district. The highest yield, B:C ratio and perent pest reduction was obtained T_2 and T_3treatment. The highest longevity duration of pest out break was find in $T_2$and T_3 treatment.

Table Efficacy of different pesticides for stem borer management in sorghum.

Technology Option	No.of trials	Pest reduction (%)	Yield (q/ha)	Increase in yield (%)	Net Returns (Rs./ha)	B:C Ratio
T_1-Lambda Cyhalothrin 5% EC @ 1.5 ml/lit. (Farmers practice)	10	61.15	463	--	33945	1.75
T_2- Chlorantraniliprole18.5% SC @ 0.40 ml/lit.(Assessment)		71.26	496	7.13	35640	1.88

5.

Problem definition: Sucking pest management in tinda vegetable.

Technology Assessed: Emamectin benzoate 5% SG@ 0.4 gm/lit. water for thrips management in Tinda.

Tinda (*Praecitrullusfistulosus*) which is also called Round Melon or squash melon, or Indian squash is a cucurbit grown for its immature fruits, as a vegetable popular in the area. In last two years, its area gradually increased in Hanumangarh district. Like other crops, there are many insects, pest and diseases in tinda. Among them, thrips is a major pest that leads to significant damage to the crop. Thrips suck the sap from the leaves regularly, due to this yellowing and drooping of leaves. As a result, the size and quality of fruits are affected. Prevalent pesticides are not considered more effective in thrips management. Many new molecules are available in the market for thrips management in tinda crop, which are quite effective. Therefore, there is a need to assess the new molecules in present scenario.In Tinda, spraying of 0.4 g Emamectin benzoate 5% SG per liter of water for thrips management was found effective as well as increased production, net profit and B:C ratio.

Table Efficacy of different pesticides for thrip management in tinda.

Technology Option	No.of trials	Pest reduction (%)	Yield (q/ha)	Increase in yield (%)	Net Returns (Rs./ha)	B:C Ratio

T_1-Use of Fipronil 5% SC @ 1.5 ml/lit. water. (Farmer's practice)	10	59.86	61.12	--	65857	2.56
T_2-Use of Emamectin benzoate 5% SG @ 0.4gm/lit. water.(Assessment)		80.56	83.20	36.13	76208	3.01
T_3-Use of Neem based insecticide (300 PPM) @ 5 ml/lit. water (Assessment)		65.18	67.10	09.78	76115	2.82

INTEGRETED NUTRIENT MANAGEMENT

6.

Problem definition: Poor quality of fruit & low yield.

Technology Assessed: Foliar spray of nutrientsat fruit developing stage in kinnow.

Kinnow, a mandarin hybrid (citrus nobilis lourx citrus deliciosatan) has become an important variety in north India occupying a major part of area under cultivation of fruit crops. It has assumed a special economics importance and export demand due to its high juice content, special flavor and as a rich source of vitamin C. It is a well-established fact that deficiency of nutrient deteriorates vegetative growth quality and production of fruit and causes heavy flower and fruit drops which resulted in production of poor quality fruit coupled with yield losses.

Table **Impact of foliar spray of nutrient on fruit quality, size and yield of kinnow**

Technology Option	***No.of trials***	***Yield (q/ha)***	***Increase in yield (%)***	***Net Returns (Rs./ha)***	***BC Ratio***
T_1-Spray of micronutrients (6 elements) (Farmers Practice)	10	337.0	--	227264	3.5
T_2-Three times spray of nutrients in June to August ($ZnSO_4$ 0.3% + K_2SO_4 0.8% + $MgSO_4$ 0.2% + $MnSO_4$ 0.2% + Urea 0.15%) (Assessment)		379.1	12.5	302043	4.2

Foliar spray of nutrients at fruit developing is improved the quality & size of fruits which gave more B:C Ratio.

7.

Problem definition: Poor quality & low yield of onion.

Technology Assessed: Foliar spray of micronutrientsat bulb developing stage in onion.

Onion is a cash crop the grown mainly in summer season in north India. It is very important in cooking. Hence it is called the Queen of kitchen. It is valued for in distinct pungent flavour. Nutrients play a major role in production. Nutrients normally applied in soil at primary stage of crops by the farmers. But foliar spray of micronutrients at bulb stage may play a major role in increase the yield.

Table **Impact of foliar spray of nutrient on fruit quality, size and yield of onion**

Technology Option	***No.of trials***	***Yield (q/ha)***	***Increase in yield (%)***	***Net Returns (Rs./ha)***	***BC Ratio***
T_1-No use of micronutrients (Farmers Practice)	10	233.9	--	211848	2.8

T_2-Foliar spray of micronutrients(Zn+Fe+Mn+Cu+Bo+Mo) (Assessment)		245.7	4.8	225968	2.9

Foliar spray of micronutrient at bulb developing stage is improved the quality & size of bulbs which gave more B:C Ratio.

LIVE**STOCK **ENTERPRISES

8.

Problem definition: Low milk production due to low digestibility of feed stuff given to animals.

Technology Assessed: Balance feeding with probiotic supplementation in cattle. (2^{nd} year 2020-21)

Low milk production due to low digestibility of feed stuff given to animals because of improper activity of microbes on feed stuff. Resulting undigested/unabsorbed feed stuff come out in faeces.

Probiotics are feed additives used to strengthen the animal digestive system and increase digestibility. Probiotic increases the number of micro-organisms of the GI track (gastro intestinal track) in animals. Therefore, the maximum digestion of feed is done, and proper use of the digestive food is utilized by animal for health and milk production.

Probiotics can be used to strengthen the animal digestive system and increase its digestibility. Use of probiotics increases animal production and reproductive efficiency.

Therefore, need to assess probiotics use in lactating animals.

Table Performance of technology

Technology option	Ave. Milk Prod.(lit.)	Average increase in milk prod.	Cost of feeding (Rs. / Ani. / day)	Gross cost of Milk (Rs. / Ani. /day)	Net profit (Rs.)	B:C Ratio
T_1 Balance feeding (include Mineral mixture)	11.1	25.23%	164.2	288.6	124.4	1.76
T_2 : Balance feeding + Probiotics (Assessment)	13.9		189.8	361.4	176.6	1.90

The results showed that supplementation of probiotic with balance diet improve digestion of animals, resulting milk production of animals increases by 25.23% (T1 – 11.1 lit/day/animal and T2 - 13.9 lit/day/animal).Cost Benefit ratio was found to be maximum in T2 group (1.90) as compared to T1 groups (1.76); however, the net profit was the highest from T2 group of lactating cattle (Rs 176.6/unit).

9.

Technological Problem: Low milk production in lactating buffalo

Technology Assessed : Balance feeding with chelated mineral mixture in buffalo. (2^{nd} year 2020-21)

Green fodder, dry fodder, concentrate with mineral mixture are normal component of feed of animal diet, out of which various minerals like Ca, P, Na, Cl, S, Cu, Co, Fe, Zn, Mn, Mg, I, etc play important role (catalyst) in chemical reactions of body which are necessary for

production, reproduction, and maintenance of animal body. It has been observed that most of the farmers are using non chelated mineral mixture in normal diet of dairy animals. Sometimes animal body is not able to absorb minerals due to inactive/non-chelated form of minerals.

Non-chelated form of minerals sometime alters during digestion process and not absorbed by intestine. Resulted, animal production and reproduction performance decreases.

Chelated form of minerals is active and organic form of minerals which is easily absorbed in intestine. So, need to assess chelated mineral mixture in lactating buffalo.

Table Performance of technology

Technology option	Ave. Milk Prod.(lit.)	Average increase in milk prod.	cost of feeding (Rs./ Ani./ day)	Gross cost of Milk (Rs./ Ani. /day)	Net profit (Rs.)	B:C Ratio
T_1 Balance feeding (include Mineral mixture)	19.11	24.54	273.05	535.08	262.03	1.96
T_2 :Balance feeding + Chelated Mineral mixture (Assessment)	23.8		283.96	666.4	382.44	2.35

TECHNICAL ACHIEVEMENTS 2022

3.A. Details of target and achievements of mandatory activities by KVK during 2022

OFT (Technology Assessment)				FLD (Oilseeds, Pulses, Cotton, Other Crops/Enterprises)			
1				2			
Number of OFTs		Total no. of Trials		Area in ha		Number of Farmers	
Targets	Achievement	Targets	Achievement	Targets	Achievement	Targets	Achievement
09	05	90	50	150.	173.15	500	516
				140 nos.	140 nos.	140	140

Training (including sponsored, vocational and other trainings carried under Rainwater Harvesting Unit)					Extension Activities			
3					4			
Number of Courses			Number of Participants		Number of activities		Number of participants	
Clientele	Targets	Achievement	Targets	Achievement	Targets	Achievement	Targets	Achievement
Farmers	50	49	2500	2373	500	534	50000	56347
Rural youth	5	3	200	98				
Extn. Functionaries	2	2	60	66				

Sponsored training	10	10	350	306				
Voccational training	2	2	50	52				

Seed Production (Qtl.)			Planting material (Nos.)		
5			6		
Target	**Achievement**	**Distributed to no. of farmers**	**Target**	**Achievement**	**Distributed to no. of farmers**
125	123.36	636	60000	62595	2433

TECHNOLOGY ASSESSMENT 2022

Summary of technologies assessed under various crops by KVKs

Thematic areas	Crop	Name of the technology assessed	No. of trials	No. of farmers
Integrated Nutrient Management	Cotton	Foliar application of 1% Magnesium sulphate in cotton crop	01	10
	Kinnow	Foliar spray of nutrients at fruit developing stage in kinnow	01	10
	Onion	Foliar spray of micronutrients at bulb developing stage in onion	01	10
Integrated Pest Management	Kinnow	Sodium Hypochlorite 5% for gummosis management in kinnow	01	10
Total			**04**	**40**

Summary of technologies assessed under livestock by KVKs

Thematic areas	Name of the livestock enterprise	Name of the technology assessed	No. of trials	No. of farmers
Feed and Fodder management	Goatry	Balance feed + 50% moringa leaves (according to body weight).	01	10
Total			**01**	**10**

Summary of technologies assessed under various enterprises by KVKs

Thematic areas	Enterprise	Name of the technology assessed	No. of trials	No. of farmers

Note: Suppose **IPM in paddy** is the technology assessed by 50 KVKs in the Zone with 5 trials by each KVK, then IPM in paddy needs to be considered as a single technology, with 50*5 = 250 trials and No. of KVKs will be 50. In addition, please note that even if IPM in paddy is done with various combinations of Technology Options (treatments), it may be considered as a single technology only.

TECHNOLOGY ASSESSMENT IN DETAIL

(From each state please include the full details of three OFTs on technology assessment under the broad thematic areas such as Integrated Crop Management, weed management, pest and disease management, nutrient management, resource conservation, livestock enterprises, Integrated Nutrient Management)

PEST AND DISEASE MANAGEMENT

1.

Problem definition: Gummosis management in Kinnow.

Technology Assessed: Sodium Hypochlorite 5% for gummosis management in kinnow.

Kinnow is an important fruit crop of Hanumangarh district. The plants mainly suffer from gummosis (Foot rot) caused by *Phytophthora polmivora*. Phytophthora is most destructive pathogen of Kinnow plant and responsible for significant economic losses to orchardist. To combat this problem, we frame a work on farm trial and found that on the management of gummosis in kinnow. Farmers generally used Paste the solution of Ridomil MZ @ 2g + 100 ml linseed oil on infected trunk and branches and drenching of Redomil MZ @25 gm per plant twice in a year but is not effective to control this disease so, we design to conduct OFT on Gummosis management. Results showed that the spray of Sodium Hypochlorite 5% was found to be more effective than Ridomil MZ in the management of gummosis disease.

Table Efficacy of different pesticides for Gummosis management in Kinnow.

Technology Option	No. of trials	Recovery from trunk lesion (%)	Reduction in Phytophthora propagule density (%)	Yield (q/ha)	Spray cost per plant (Rs.)	B:C Ratio
T_1- Paste of Ridomil MZ @ 2g + 100 ml linseed oil on infected trunk and branches and drenching of Redomil MZ @25 gm per plant twice in a year. (Farmer's practice)	10	57.36	81.23	347	118.00	4.05
T_2- Spray of Sodium Hypochlorite 5% @ 50 ml/ 10 liter water on affected trunk & branches twice in a year		68.89	87.85	366	34.95	5.25

INTEGRATED NUTRIENT MANAGEMENT

2.

Problem definition: Low yield of cotton.

Technology Assessed: Foliar application of 1% Magnesium sulphate in cotton crop.

Bt cotton is grown in 67% of the total cotton growing area of this district. Sometimes the leaves turn red at the full bloom and boll development stages in cotton. Due to this the process of photosynthesis is interrupted and the leaves of plants do not produce food. As a result, the development of bolls does not occur smoothly and production is reduced.

The study found that the reddening of cotton leaves (The purplish red leaves with green veins) is due to magnesium deficiency. If the farmer does two sprays of 1% solution of Magnesium Sulphate @ 250 litres per hectare at 15 days interval during full bloom and boll development stages, then magnesium deficiency in the cotton crop can be overcome. Therefore, an On Farm Trial was conducted on "Nutrient management in cotton". and it was found that the crop sprayed with 1% 1% Magnesium sulphate (1 kg in 100 litres of water @ 250 litres per hectare) at 15 days interval during full bloom and boll development stages) did not have reddening of leaves and yield increased by 19.59% as compared to the control.

Table: Performance of varieties in reference of yield and income of Cotton.

Technology Option	No. of trials	Yield (q/ha)	Increase in Yield (%)	Net Returns (Rs./ha)	B:C Ratio
No use of Magnesium Sulphate. (Control)	10	11.94	--	51500	2.03
Two sprays of 1% magnesium sulphate (Assessment)		14.28	19.59	68626	2.30

3.

Problem definition: Poor quality of fruit & low yield.

Technology Assessed: Foliar spray of nutrients at fruit developing stage in kinnow.

Kinnow, a mandarin hybrid (citrus nobilis lourx citrus deliciosatan) has become an important variety in north India occupying a major part of area under cultivation of fruit crops. It has assumed a special economics importance and export demand due to its high juice content, special flavor and as a rich source of vitamin C. It is a well-established fact that deficiency of nutrient deteriorates vegetative growth quality and production of fruit and causes heavy flower and fruit drops which resulted in production of poor quality fruit coupled with yield losses.

Table **Impact of foliar spray of nutrient on fruit quality, size and yield of kinnow**

Technology Option	*No. of trials*	*Yield (q/ha)*	*Increase in yield (%)*	*Net Returns (Rs./ha)*	*BC Ratio*
T_1-Spray of micronutrients (6 elements) (Farmers Practice)	10	276.8	--	359690	5.6
T_2-Three times spray of nutrients in June to August ($ZnSO_4$ 0.3% + K_2SO_4 0.8% + $MgSO_4$ 0.2% + $MnSO_4$ 0.2% + Urea 0.15%) (Assessment)		305.1	10.2	463335	4.7

Foliar spray of nutrients at fruit developing stage is improved the quality & size of fruits which gave more B:C Ratio.

4.

Problem definition: Poor quality & low yield of onion.

Technology Assessed: Foliar spray of micronutrients at bulb developing stage in onion.

Onion is a cash crop the grown mainly in summer season in north India. It is very important in cooking. Hence it is called the Queen of kitchen. It is valued for in distinct pungent flavour. Nutrients play a major role in production. Nutrients normally applied in soil at primary stage of crops by the farmers. But foliar spray of micronutrients at bulb stage may play a major role in increase the yield.

Table **Impact of foliar spray of nutrient on fruit quality, size and yield of onion**

Technology Option	*No. of trials*	*Yield (q/ha)*	*Increase in yield (%)*	*Net Returns (Rs./ha)*	*BC Ratio*
T_1-No use of micronutrients (Farmers Practice)	10	184.4	--	88388	1.9
T_2-Foliar spray of micronutrients (Zn+Fe+Mn+Cu+Bo+Mo) (Assessment)		198.9	7.9	100888	2.0

Foliar spray of micronutrient at bulb developing stage is improved the quality & size of bulbs which gave more B:C Ratio.

LIVESTOCK ENTERPRISES

5.

Problem definition: Poor economics of male goat rearing for meat purpose.

Technology Assessed: Balance feed + 50% moringa leaves (according to body weight). (1st year 2021-22)

Goat farmers of the district are generally rear male goat for meat purpose. They generally allow to feed them legume green fodder, Dry fodder and concentrate which having high amount of pulses for proper muscle development in male goats. Higher amount of pulses increases cost of production. Resulting B:C ratio decreases. Growing male goats require high protein in their diet for development of muscles. Retarded growth in male goat due to low protein in diet. Moringa leaves that have 18.23% CP, and 9.6 MJ/kg energy which improve the growth performance in goats. Feeding Moringa leaves can increase goat body weight, improve the digestion and absorption of nutrients to be more effective.

Table **Performance of moringa leaves as source of protein.**

Technology Option	*No. of trials*	*Body wt. (kg/ani.)*	*Increase in body wt. (%)*	*Gross cost (Rs./ani.)*	*Net Returns (Rs./ha)*	*BC Ratio*
T_1- Dry fodder+ Green fodder + concentrate (Farmer's practice)	10	40.34	--	5226.35	8892.65	2.7
T_2- Balance feed + 50% moringa leaves (according to body weight) (Assessment)		42.20	4.61	5073.18	9696.83	2.9

TECHNICAL ACHIEVEMENTS 2023

3.A. Details of target and achievements of mandatory activities by KVK during 2023

OFT (Technology Assessment)	FLD (Oilseeds, Pulses, Cotton, Other Crops/Enterprises)

1				2			
Number of OFTs		Total no. of Trials		Area in ha		Number of Farmers	
Targets	Achievement	Targets	Achievement	Targets	Achievement	Targets	Achievement
6	6	60	60	125	184.2	330	478

Training (including sponsored, vocational, and other trainings carried under Rainwater Harvesting Unit)					Extension Activities			
3					4			
Number of Courses			Number of Participants		Number of activities		Number of participants	
Clientele	Targets	Achievement	Targets	Achievement	Targets	Achievement	Targets	Achievement
Farmers	46	42	1585	1539	40000	42670	350000	366875
Rural youth	2	2	50	40				
Extn. Functionaries	4	3	100	100				
Sponsord Training	0	6	0	270				
Vocational Training	4	2	100	50				

Seed Production (Qtl.)			Planting material (Nos.)		
5			6		
Target	Achievement	Distributed to no. of farmers	Target	Achievement	Distributed to no. of farmers
170	175.69	313	60,000	62,595	5501

TECHNOLOGY ASSESSMENT 2023

Summary of technologies assessed under various crops by KVKs

Thematic areas	Crop	Name of the technology assessed	No. of trials	No. of farmers
Integrated Nutrient Management	Wheat	Foliar application of 0.5% Manganese sulphate in wheat	10	10
	Kinnow	Foliar application of 0.1% KNO_3 in kinnow	10	10
Integrated Pest Management	Cotton	Mass trapping of male adults of Pink bollworms by installing pheromone traps @ 16 per acre with IPM practices.	10	10
Integrated Disease Management	Wheat	Sprays of Azoxystrobin 18.2% + Difenoconozole 11.4% W/W SC @ 1ml/lit.	10	10

Total	**40**	**40**

Summary of technologies assessed under livestock by KVKs

Thematic areas	Name of the livestock enterprise	Name of the technology assessed	No. of trials	No. of farmers
Disease Management	Cross bread cattle	Assessment of clinical remedies to control repeat breeding in cross breed cattle	10	10
Nutrition Management	Goatry	Dry fodder+ Green fodder + 50% concentrate + 50% moringa leaves.	10	10
Total			**20**	**20**

Summary of technologies assessed under various enterprises by KVKs

Thematic areas	Enterprise	Name of the technology assessed	No. of trials	No. of farmers

TECHNOLOGY ASSESSMENT IN DETAIL

PEST AND DISEASE MANAGEMENT

Problem definition: *Heavy infestation of pink bollworm in cotton effecting in a yield loss of 30-50%.*

Technology Assessed : *Mass trapping of male adults of Pink bollworms by installing pheromone traps @ 16 per acre with IPM practices.*

KVK, Hanumangarh-I conducted trial to assess a potential solution for management of Pink bollworm in cotton crop and found that as potential solution is adoption of mass trapping of male adults of the pest to stop or minimize its population dynamics, ultimately management of the pest.

Table Effect of mass trapping & IPM practices in management of Pink bollworms in cotton.

Technology Option	*No. of trials*	*Av. no. of moth catches per trap*	*% no. of infested bolls*	*Yield (q/ha)*	*Net Return (Rs./ha)*	*B:C Ratio*
Using various insecticides for pink bollworm management (Farmers Practice)	*10*	-	*6.5*	*12.5*	*44250*	*1.79*
Mass trapping for male adults of pink bollworms by Installing Pheromone traps @16 per acre +IPM (Assessment)		*7.52*	*3.25*	*14.38*	*62290*	*2.18*

PEST AND DISEASE MANAGEMENT

Problem definition: *Incidence of Yellow & brown rust in wheat crop.*

Technology Assessed : *Use of new molecules for management of yellow & brown rust in wheat crop.*

KVK, Hanumagarh-I conducted trial to find out suitable management of yellow & brown rust in wheat crop as the farmer's practice could not manage the incidence of yellow & brown rust to the desired level. Use of new molecules found better and that the same had enhanced the yield by 8.96 per cent compared to farmer's practice.

Table Effect of foliar spray of Manganese Sulphate on yield of wheat

Technology Option	No. of trials	Yield (qt./ha)	Increase in yield (%)	Net Return (Rs./ha)	B:C Ratio
Spray of Propiconazole 25 EC @ 1 ml/lit. (Farmers Practice)	*10*	*40.73*	*--*	*70531*	*2.96*
Sprays of Azoxystrobin 18.2% + Difenoconozole 11.4% W/W SC @ 1ml/lit.		*44.38*	*8.96*	*77625*	*3.06*

NUTRIENT MANAGEMENT

Problem definition: *Poor quality & low yield in Kinnow.*

Technology Assessed: *Nutrient management in Kinnow.*

KVK, Hanumangarh-I assess the technology of integrated nutrient 10management by the foliar application of potassium nitrate and found that the same had enhanced the yield by 6.9 per cent compared to farmers practice and quality also improved of kinnow {Mandarin hybrid (Citrus nobilis lour X citrus deliciosatan)} fruits.

Table Effect of foliar spray of KNO_3 in kinnow for improve the quality & yield.

Technology Option	No. of trials	Yield (q/ha)	Increase in Yield (%)	Net Returns (Rs./ha)	B:C Ratio
No foliar spray of KNO_3 (Farmers Practice)	*10*	*384.0*	*-*	*265554*	*3.70*
Three foliar spray of KNO_3 @ 0.1% in the end of May, June & July month. (Assessment)		*410.5*	*6.9*	*329159*	*4.20*

NUTRIENT MANAGEMENT

Problem definition: *Low yield of wheat.*

Technology Assessed : *Nutrient management in wheat crop.*

KVK, Hanumangarh-I assess the technology of integrated nutrient management by the foliar application of Manganese Sulphate solution in wheat crop and found that the same had enhanced the yield by 9.15 per cent compared to farmer's practice.

Table Effect of foliar spray of Manganese Sulphate on yield of wheat

Technology Option	No. of trials	Yield (qt./ha)	Increase in yield (%)	Net Return (Rs./ha)	B:C Ratio
No foliar spray of $MnSO_4$ (Farmer's Practice)	*10*	*40.86*	*--*	*72619*	*3.12*

Two sprays of 0.5% Manganese Sulphate @ 200 lit./ha when deficiency symptoms appear and one week thereafter.		*44.20*	*8.18*	*79475*	*3.25*

LIVE STOCK ENTERPRISES

Problem definition: *Poor economics of male goat rearing for meat purpose.*

Technology Assessed: *Dry fodder+ Green fodder + 50% concentrate + 50% moringa leaves. (2nd year 2022-23)*

KVK, Hanumangarh-I conducted trial to evaluate low cost and nutritious feed for goat kids. In which Moringa leaves were included in place of concentrate feed. Moringa leaves that have 18.23% CP, and 9.6 MJ/kg energy which improve the growth performance in goats. Feeding Moringa leaves increases goat body weight, improve the digestion and absorption of nutrients in GI track.

Table Performance of moringa leaves as source of protein

Technology Option	***No. of trials***	***Body wt. gain (kg/ani.)***	***body wt. gain (%)***	***Gross cost (Rs./ani.)***	***Net Returns (Rs./ha)***	***BC Ratio***
T_1- Dry fodder+ Green fodder + concentrate (Farmer's practice)	*10*	***28.60***	*16.78*	*5236.35*	*8952.65*	*2.71*
T_2 - Dry fodder+ Green fodder + 50% concentrate + 50% moringa leaves (according to body weight) (Assessment)		***30.97***	*17.02*	*5033.18*	*9954.83*	*2.97*

LIVE STOCK ENTERPRISES

Problem definition: *Higher incidences of repeat breeding, Anestrous in crossbreed cattle due to hormonal imbalance.*

Technology Assessed: *Assessment of clinical remedies to control repeat breeding in cross breed cattle.*

KVK, Hanumangarh-I conducted trial to improvement of conception rate in cross breed cattle by using Dewormer (inj. ivermectin S/C 10 ml)/animal + Chelated Mineral mixture supplementation @ 30 g/bd /animal & inj. Receptal I/M 2.5ml (72-96 hrs before AI). Results reveled that the same had enhanced the conception rate by 90 per cent compared to farmer's practice.

Table Performance of clinical remedies on conception rate in cross breed cattle.

Technology Option	***No. of trials***	***No. of animals comes in heat & conceived***
T_1- Balanced diet (balance feed with deworming and mineral mixture) (Farmer's practice)	10	------
T_2 - Use of Dewormer (10 ml ivermectin inj.)/animal + Mineral mixture supplementation @ 30 g/bd /animal & Receptal inj 2.5ml (72-96 hrs before AI) (Assessment)		*9 Animals conceived out of 10*

TECHNICAL ACHIEVEMENTS 2024

3.A. Details of target and achievements of mandatory activities by KVK during 2024

OFT (Technology Assessment)				FLD (Oilseeds, Pulses, Cotton, Other Crops/Enterprises)			
1				2			
Number of OFTs		Total no. of Trials		Area in ha		Number of Farmers	
Targets	Achievement	Targets	Achievement	Targets	Achievement	Targets	Achievement
5	2	50	20	90 ha/20 units	85.75 ha & 60 units	300	350

Training (including sponsored, vocational, and other trainings carried under Rainwater Harvesting Unit)					Extension Activities			
3					4			
Number of Courses			Number of Participants		Number of activities		Number of participants	
Clientele	Targets	Achievement	Targets	Achievement	Targets	Achievement	Targets	Achievement
Farmers	40	37	1200	1445	40000	37464	300000	287505
Rural youth	10	10	300	350				
Extn. Functionaries	02	02	50	49				
Sponsored Training	10	11	300	330				
Vocational Training	05	05	125	114				

Seed Production (Qtl.)			Planting material (Nos.)		
5			6		
Target	Achievement	Distributed to no. of farmers	Target	Achievement	Distributed to no. of farmers
300	298.21	916	70,000	69411	4976

I.A TECHNOLOGY ASSESSMENT 2024

Summary of technologies assessed under various crops by KVKs

Thematic areas	Crop	Name of the technology assessed	No. of trials	No. of farmers
Integrated Pest Management	Cotton	Mass trapping of male adults of Pink bollworms by installing pheromone traps @ 16 per acre with IPM practices.	10	10

Integrated Crop Management				
Integrated Disease Management				
Small Scale Income Generation Enterprises				
Weed Management				
Resource Conservation Technology				
Farm Machineries				
Integrated Farming System				
Seed / Plant production				
Post Harvest Technology / Value addition				
Drudgery Reduction				
Storage Technique				
Others (Pl. specify)				
Total				

Summary of technologies assessed under livestock by KVKs

Thematic areas	Name of the livestock enterprise	Name of the technology assessed	No. of trials	No. of farmers
Disease Management	Cross breed cattle	Assessment of clinical remedies to control repeat breeding in cross breed cattle	10	10
Evaluation of Breeds				
Feed and Fodder management				
Nutrition Management				
Production and Management				
Others (Pl. specify)				
Total				

Summary of technologies assessed under various enterprises by KVKs

Thematic areas	Enterprise	Name of the technology assessed	No. of trials	No. of farmers

Note: Suppose **IPM in paddy** is the technology assessed by 50 KVKs in the Zone with 5 trials by each KVK, then IPM in paddy needs to be considered as a single technology, with 50*5 = 250 trials and No. of KVKs will be 50. In addition, please note that even if IPM in paddy is done with various combinations of Technology Options (treatments), it may be considered as a single technology only.

TECHNOLOGY ASSESSMENT IN DETAIL

PEST AND DISEASE MANAGEMENT

Problem definition: *Heavy infestation of pink bollworm in cotton effecting in a yield loss of 30-50%.*

Technology Assessed : *Mass trapping of male adults of Pink bollworms by installing pheromone traps @ 16 per acre with IPM practices.*

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Technology Option	*No. of trials*	*Av. no. of moth catches per trap*	*% no. of infested bolls*	*Yield (q/ha)*	*Net Return (Rs./ha)*	*B:C Ratio*
Using various insecticides for pink bollworm management (Farmers Practice)	*10*	*-*	*22*	*16.00*	*59889*	*2.07*
Mass trapping for male adults of pink bollworms by Installing Pheromone traps @16 per acre +IPM (Assessment)		*10.9*	*9*	*17.95*	*72707*	*2.27*

LIVE STOCK ENTERPRISES

Problem definition: *Higher incidences of repeat breeding, Anestrous in crossbreed cattle due to hormonal imbalance.*
Technology Assessed: *Assessment of clinical remedies to control repeat breeding in cross breed cattle.*

KVK, Hanumangarh-I conducted trial to improvement of conception rate in cross breed cattle by using Dewormer (inj. ivermectin S/C 10 ml)/animal + Chelated Mineral mixture supplementation @ 30 g/bd /animal & inj. Receptal I/M 2.5ml (72-96 hrs before AI). Results reveled that the same had enhanced the conception rate by 90 per cent compared to farmer's practice.

Table Performance of clinical remedies on conception rate in cross breed cattle.

Technology Option	*No. of trials*	*No. of animals comes in heat & conceived*
T_1- Balanced diet (balance feed with deworming and mineral mixture) (Farmer's practice)	10	------
T_2 - Use of Dewormer (10 ml ivermectin inj.)/animal + Mineral mixture supplementation @ 30 g/bd /animal & Receptal inj 2.5ml (72-96 hrs before AI) (Assessment)		*9 Animals conceived out of 10*