National Workshop on "Horticulture & Plantation Crops for enhancing income of the farmers under watershed projects of WDC-PMKSY-2.0"

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1. Name of State: Himachal Pradesh

State Department of Horticulture

Name of speaker

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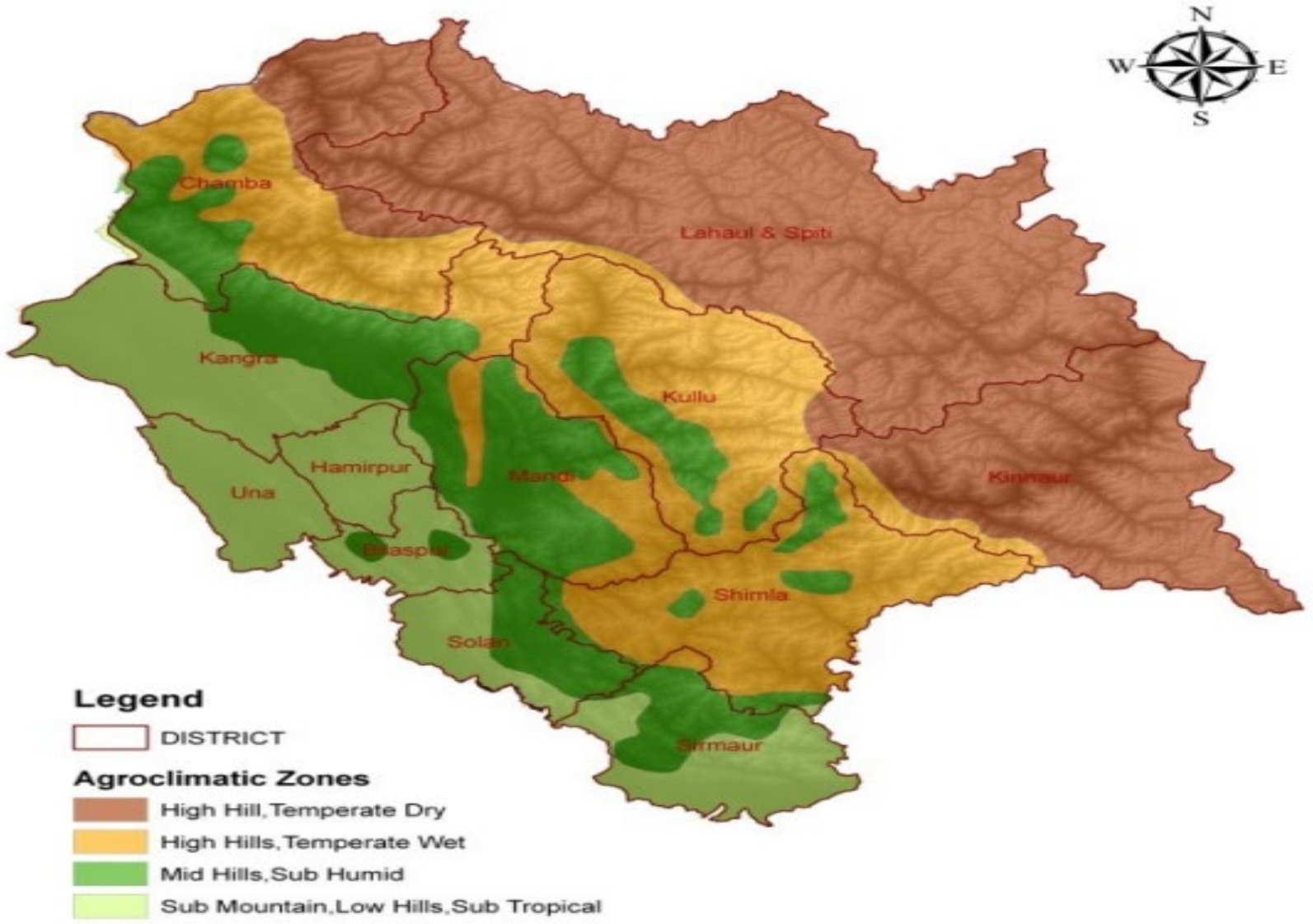
State Department of Horticulture

Nav Bahar, Shimla- 2

2. Number of Agro-Ecological Regions or Agro-climatic zones in the State: Four (4)

Region / Zone	Name of Agro-Ecological Region or Agro-climatic zone	Altitude (m.a.m.s.l.)	Areas of districts falling under the region or zone	Fruit & other crops that can be grown
I	Sub-tropical region or zone (Sub mountain & low hills	< 914	Districts of Una & Hamirpur & lower mountainous areas of districts of Chamba, Kangra, Bilaspur, Mandi, Solan & Sirmour	**Mango, litchi, citrus fruits, guava, ber, loquat, papaya, peach, plum etc.** **Wheat, maize, paddy, black gram, sugarcane, mustard, potato, vegetables, pulses, barley, fodder crops etc.**
II	Sub humid temperate region or zone (Mid hills)	915-1523	Mid hill areas of districts of Bilaspur, Chamba, Kangra, Mandi, Solan, Kullu, Shimla & Sirmour	**Apple, pear, walnut, lemon & lime, hill lemon, pomegranate, kiwifruit, stone fruits viz., cherry, plum, apricot, pecan nut etc.** **Wheat, maize, paddy, beans, pulses, vegetables including peas, fodder crops etc.**
III	Temperate wet region or zone (High hills)	1524-2472	High hilly areas of districts of Chamba, Kangra, Mandi, Solan, Kullu, Shimla, Sirmour, Kinnaur	**Apple, pear, cherry, almond, walnut etc.** **Millets, buck wheat, amaranthus, maize, potato, peas, out of season vegetables, exotic vegetables etc.**
IV	Temperate dry region or zone (High hills)	>2472	Districts of Lahaul & Spiti & major part of district Kinnaur & some area of district of Chamba	**Apple, pear, walnut, apricot, grapes, hazelnut etc.** **Millets, potato, peas & out of season vegetables, kala zeera etc.**

Horticulture Crop Zones of HP



Scenario of fruits & vegetables area and production in India & Himachal Pradesh:

The diverse climate of Himachal Pradesh ensure the production & availability of varieties of most of the fruits & vegetables.

India			Year: 2021-22	Major crops
Horticultural produce	Production (million MTs)	Area (million hectares)	Productivity (MTs / ha)	
Fruits	107.2	7.1	15.1	Banana, mango & citrus fruits.
Vegetables	204.8	11.3	18.1	Potato, onion & tomato
Other horticultural crops	30.3	9.7	3.1	
Total	342.3	28.1	12.1	

Himachal Pradesh			Year: 2021-22	Major crops
Horticultural produce	Production (lakh MTs)	Area (lakh hectares)	Productivity (MTs / ha)	
Fruits	7.97	2.35	3.4	Apple, Mango & Citrus fruits.
Vegetables	18.75	0.92	20.4	Tomato, peas, potato, cabbage & cauliflower
Total	26.71	3.27	8.2	

Crop & year wise area (hectares) brought under Drip Irrigation in fruits & vegetables grown in Himachal Pradesh:

Source: State Department of Horticulture, H.P.

Crop/ year	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	Total
Fruits:								
Apple	228.77	230.84	125.10	169.85	300.58	320.10		1375.24
Peach	190.32	216.85	93.65	95.68	254.15	285.00		1135.65
Guava	---	---	---	---	30.11	40.25		70.36
Litchi	---	---	---	---	30.55	15.47		46.02
Pomegranate	5.25	5.68	---	---	7.59	6.48		25.00
Sweet orange	---	---	---	---	48.14	20.00		68.14
Sub totals	424.34	453.37	218.75	265.53	671.12	687.30		2720.41
Vegetables:								
Cauliflower	85.45	85.11	---	70.58	200.56	250.98		692.68
Cabbage	45.85	95.45	---	---	185.47	220.58		547.35
Peas	42.68	55.21	---	13.61	95.48	104.00		310.98
Tomato	68.41	98.14	5.68	46.58	187.59	298.00		704.40
Capsicum	52.87	80.01	6.95	25.00	169.88	293.00		627.71
Cucumber	15.96	5.14	---	---	15.78	28.45		65.33
Beans	15.98	5.00	---	---	14.97	25.12		61.07
Onion	5.87	4.00	---	---	5.47	7.59		22.93
Misc.	5.15	55.70	---	---	---	---		60.85
Sub totals	338.22	483.76	12.63	155.77	875.20	1227.72		3093.30
Grand totals	762.56	937.13	231.38	421.30	1546.32	1915.02	86.30	5900.01

3. Existing horticulture and plantation practices in different AC zones of H.P.:

Agro-Ecological region or Agro-climatic zone	Fruits	Vegetables	Floriculture**	Plantation / Agri. crops	Spices	Aromatic plants	Medicinal plants	Any other
I	Mango, guava, litchi, citrus fruits, papaya, strawberry, pomegranate, dragon fruit, jackfruit etc.	Cucumber, cabbage, cauliflower, tomato, pea, beans, onion, potato, brinjal, French beans, okra (ladyfinger), other cucurbits.	Carnation, Marigold, Gladiolus, Lilium, Chrysanthemum, Gypsophylla, Gerbera, Roses etc.	Wheat, maize, paddy, black gram, mustard, soyabean, potato etc.	Ginger, turmeric	N.A.	N.A.	N.A.
II	Apple, Pear, Kiwifruit, Pomegranate, mango, litchi, citrus fruits, papaya, stone fruits, persimmon etc.	Cauliflower, French beans, cabbage, pea, tomato, capsicum, cucumber, beans etc.	Carnation, Chrysanthemum, Gypsphylla, Gerbera, Roses, Lillium etc.	Wheat, maize, paddy, pulses etc.	Ginger, turmeric	N.A.	N.A.	N.A.
III	Apple, pear, stone fruits, persimmon, pomegranate, walnut etc.	Cauliflower, cabbage, pea, capsicum. potato, tomato** in playhouse	Carnation, Gypsophylla, Lilium, Roses etc.	Wheat, maize, pulses etc.	Ginger	N.A.	N.A.	N.A.
IV	Apple, walnut, grapes etc.	Pea, potato & out of season cabbage & cauliflower etc.	----	N.A.	N.A.	N.A.	N.A.	N.A.

Irrespective of the horticultural crops, the micro-irrigation systems viz., drip irrigation & sprinkler irrigation systems have been got installed by the farmers but the water sources are either individual water storage tanks or bore wells.

The micro-irrigation system viz., drip irrigation & misters / foggers are a part of the poly or green houses or green houses that are being got established by the farmers under MIDH, HPKY & some other schemes being implemented by the Department of Agriculture. So the such micro-irrigation systems are not covered under PMKSY.

It is important to mention that the water soluble fertilizers are applied to the crops through the drip irrigation systems.

4. Costs & returns of the crops as listed above (per hectare):

S. No.	Name of crop	Approximate cost (Rupees / ha) ***	Approximate return *** (Rupees / ha)	Remarks
01.	Guava	1,20,000	2,20,000	Based on the Evaluation Criteria of Fruit Crops in Himachal Pradesh, Department of Horticulture, H.P.
02.	Litchi	1,20,000	3,00,000	
03.	Sweet orange	2,00,000	3,00,000	
04.	Pomegranate	1,60,000	2,20,000	
05.	Peach	2,10,000	2,80,000	
06.	Apple	3,00,000	4,70,000	
07.	For other crops	Nott available	Not available	For crops other than fruits information is not available

*** The cost & return of different fruit crops varies from an area of production & season of harvest.

5. Constraints & bottlenecks in existing practices:

Crops	Quality seeds / variety	Technology	Irrigation	Area expansion	Cropping intensity	Storage	Processing	Value Chain	Marketing	Any other
Fruits	N.A.	A.	N.A.	Yes	100%	P.A.	M.A.	N.A.	A.	---
Vegetables	A.	A.	N.A.	Yes	200%	P.A.	P.A.	N.A.	A.	---
Floriculture	A.	A.	N.A.	Yes	?	P.A.	?	N.A.	A.	---
Plantation crops	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	----
Spices	N.A.	A.	N.A.	Yes	50-200%	N.A.	A.	N.A.	A.	---
Aromatic plants	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	----
Medicinal plants	?	?	?	?	?	?	?	?	?	?
Any other	---	---	---	---	---	---	---	---	---	---

N. A. = Not available

P. A. = Partially available

A. = Available

M. A. = Minimally available

Continued…..

Constraints and bottlenecks in existing practices:

Crops	Quality seeds / variety	Technology	Irrigat-ion	Area expan-sion	Cropping intensity	Storage	Processing	Value chain	Marketing	Any other
Fruits	A big constr-aint	Conventional and 20% modern	A big constra-int. Gap in the adoption of MI i.e. Sprinkler & Drip.	Scattered land holding & non availability of irrigation	Minimum except in case of intercrop-ping	A big issue (Lacks in cold & CA storage infrastru-cture)	A big constraint (only 5% installed capacity of total fruits & vegetables production)	Another big constraint	Constraint to some extent	PHM & Processing infrastructure is very much lacking. Lacks in introduction of new fruit crops & varieties. **Weather vagaries are the another constraint.**
Vegeta-bles	Not a big constra-int	Modern techniques are being applied	Genera-lly A big constra-int. As above.	Not n that big issue	Not a constraint	As above	As above	As above	As above	**In addition to above, menace of monkeys, wild & stray animals and weather vagaries are big constraints.**
Cereal crops	Not a big constra-int	Huge gap in adoption of GAPs	Genera-lly A big constra-int. As above.	A big constraint & has & is resulting in abandoning the growing of cereal crops.	Not a constraint, as the farmers are taking 2-3 crops in some areas.	Not a big constraint	Not a constraint	Not a constraint	Not a constraint	**Menace of monkeys, wild & stray animals and weather vagaries are big constraints.**

6. Suggestions for the improvements of each category under WDC-PMKSY:

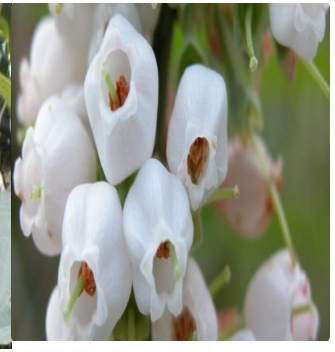
- In Himachal Pradesh, assured irrigation needs to be developed as most of the arable land is rain fed.
- In Himachal Pradesh, considering the topography & geography, there is huge potential for the development of effective watersheds.
- The development of watersheds, will increase the availability of water for the irrigation purpose that will help in increasing the production as well as farmers' income.
- It will also help in mitigation of flash floods to some extent. Thus the soil erosion will be reduced & the ground water recharging will also take place.
- New fruit crops viz., blueberry, macadamia nut, avocado, dragon fruit, gold & other kiwifruit *species*, jamun, monk fruit, dwarf, precocious, regular bearing, color & late maturing varieties of mango etc & the elite planting material of the best cultivars need to be imported from overseas nations & within India and introduced in our State of Himachal Pradesh.
- The postharvest handling & processing infrastructure needs to be strengthened to make the "hidden harvest" a part of effective production of fruits & vegetables.
- The extent of financial assistance provided by the government for the establishment of postharvest management & processing infrastructure in private sector is badly needed to be enhanced from 50% to 75-80%. The same will result in employment generation in rural areas & prevention of postharvest losses of fruits & vegetables. The value addition of "hidden harvest" will certainly contribute to a great extent in the State GDP (GSDP) & that of GDP of India.

7. Convergence of the existing programmes / schemes in enhancing the farmers' income:

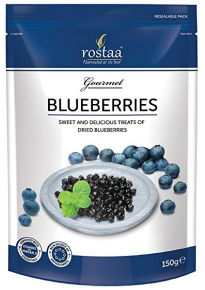
If the watersheds are developed in the State & more area is brought under irrigation, this will certainly help in the establishment of different fruits' orchards that will increase the economy of farmers, as most of the fruit crops are more remunerative than the cereal crops. So obviously, the farmers will diversify to the horticultural crops. More remunerative & healthful fruit crops viz., blueberry, macadamia nut, avocado, dragon fruit, gold & other kiwifruit *species*, jamun, monk fruit, dwarf, precocious, regular bearing, color & late maturing varieties of mango etc need to be introduced in the State of Himachal Pradesh under different schemes viz., World Bank Funded project i.e. HPHDP, Asian Development Bank (ADB) funded project HPSHIVA, Central sponsored schemes viz., MIDHG & RKVY etc. **This will certainly help in transforming Himachal Pradesh from an "Apple State" to "Fruit Bowl of India".**

Blueberries: Blueberries, highly soil pH specific crop can be grown in different parts of state of Himachal Pradesh, ranging from sub-tropical to temperate region, however one has to be very particular regarding the selection of varieties to be grown at a particular place. Currently most of the blueberries are being imported from overseas nation into India. In the Indian market, the berries are being sold at a price tag of around INR 3,000 a kg. Considering, this highly remunerative fruit crop, it has the potential to be a big game changer as far as economy of the Himachal farmers is concerned. The blueberries are generally marketed in 125 gms plastic punnets. The blueberries so produced, if needed, could be processed or preserved into value added products in the form of ready to serve i.e. RTS beverages, wine, jam, frozen dried etc.







Macadamia nut: **Macadamia nut has originated from Australia hence it is also known as Queensland nut or Australian nut. Macadamia nut is regarded as the best quality nut in the world. It is a Sub-tropical nut that is best grown up to an altitude of 750 m.a.m.s.l. The nuts are sweet and can be enjoyed & eaten as raw, roasted, fried, chocolate coated, candied, made into macadamia nut butter, oil, biscuits, cakes etc. Australia & South Africa are the largest producers of macadamia nut accounting for 50% of total world production, followed by China, Kenya, USA, Guatemala, Vietnam, Brazil, Israel, Kenya, New Zealand, Costa Rica, Bolivia, Malawi etc. Currently the macadamia nut is being imported from overseas nation into India.** Since macadamia is one of the most profitable crops to grow, therefore the area under the cultivation of macadamia nut is increasing rapidly. **It's nut gives deliciously smooth & sweet kernels that fetch a king's ransom in the grocery stores.**

Avocado: Originated in Mexico & Central America, avocado (*Persia americana)* is also called as alligator pear or butter fruit. Avocado fruit having greenish or yellowish flesh with a buttery consistency & a rich nutty flavor is high in nutrition & flavor and is one of the wonderful fruit of summer. The avocado cultivation has gained an overwhelming popularity during recent decades due to the nutritional properties of the fruits. Owing to its close resemblance to butter, avocado is named as “butter fruit”. Mexico is the largest producer & exporter of avocado in the world, followed by Chile, Indonesia, United States, Dominic Republic, Columbia, Brazil, Peru etc. Mexico, Dominican Republic, Peru, Indonesia & Columbia were the top producers of avocado worldwide in 2020. The avocado production in Asia is limited but some of the east countries like China, Vietnam, Korea etc are producing avocados. Plantations of avocados in southern states like Tamil Nadu, Kerala, Karnataka, Maharashtra, hill slopes at an elevations of 800-1600 meters a. m. s. l. in northeastern Himalayas state of Sikkim etc are scattered & hence not well organized. Since the demand of avocados within the country by the local population & that of the growing overseas’ tourists is increasing, therefore avocado fruits produced in the country can be marketed with quite an ease.

Dragon fruit:

The NITI Aayog in its report in 2017 named “Doubling Farmers” income had said that crop diversification is a major step that all farmers must take to increase their income. Dragon fruit is one of the major crops that could be adopted for this measure with demand for it increasing every year. In recent years, dragon fruit has found a growing market in India and many farmers are now adopting the cultivation of this new crop. Adaptability to new environment with abiotic stress tolerance like drought & temperature extremes and consumers’ preference for new and exotic phyto-chemically rich nutrient fruits, dragon fruit has a great commercial potential in India. Currently, the fruit is being grown in countries viz., Sri Lanka, Thailand, Malaysia, Vietnam and Israel but now many farmers have adopted its cultivation in India too. Since the majority of dragon fruit available in India is imported from Thailand, Malaysia, Vietnam & Sri Lanka, hence there is a good potential of dragon fruit cultivation in India for domestic as well as international markets viz., Gulf countries, European Union & USA. Dragon fruit (*Hylocereus undatus*), is one of the important genus of the family cactaceae that produces edible fruits. The ripe dragon fruit, besides its use for fresh consumption can be used for preparation of jam, ice cream, jelly, ready to serve i.e. RTS beverages including juice & wine etc.









Kiwifruit species:

(i). Gold kiwifruit (*Actinidia chinensis*):

- Gold kiwifruit (Zespri® SunGold™ - most promising variety of gold kiwifruit that is resistant to bacterial vine disease caused by *Pseudomonas syringae* pv actinadiae, PSA), in contrast to green kiwifruit, has smooth, fuzz-free or hairless peel that is nice golden-brown in color.
- It has vibrant yellow color with a smaller core & fewer seeds in gold or golden kiwifruit.
- Zespri® SunGold™, gold or golden kiwifruit has a totally different taste than the green kiwifruit. Zespri® SunGold™ has tropically sweet & less acidic taste.
- Some people even say if it tastes like a cross between mango and strawberry or mango and pineapple.
- Besides, skin being fuzz-free, some people use to eat this sun-kissed variety just like they would eat an apple or plum. It has a better storability compared to green kiwifruit.

Nutrition & health benefits of gold or golden kiwifruit:

- Both types of kiwifruit are full of vitamins & minerals & have little fat & sodium and no cholesterol.
- Kiwifruit are both a low glycemic index and a low FODMAP food (An acronym that describes any one of a group of compounds - Fermentable Oligo- Di- Mono-saccharides And Polyol that are poorly absorbed during digestion). These compounds which tend to be mostly carbohydrates are believed to contribute to the symptoms of irritable bowel syndrome (IBS) and similar gastrointestinal disorders. Common high FODMAP foods include milk, avocados, apples, pears, stone fruits, broccoli, wheat breads, cereals, ripe bananas, pasta, mushrooms among many more. While poor absorption of carbohydrates is common to everyone, most people do not suffer significant IBS- like symptoms. Both the green & SunGold kiwifruit being from the category of the most nutritious fruits but there are slight differences in their nutrition.

Differences in the nutrition of the green & SunGold kiwifruit:

Sr. No.	Properties	Green kiwifruit	Gold kiwifruit (Zespri® SunGold™)
01.	Calories (low)	90 per one serving of two (2) kiwifruits	110 per one serving of two (2) kiwifruits
02.	Potassium	More than a medium banana	As much as a banana
03.	Vitamin C	More than an orange & one serving covering a full day's requirement	More than green kiwi fruit & three (3) times more than orange
04.	Fibre	More than gold kiwifruit	Less than green kiwifruit
05.	Vitamin E	10% of RDV per serving	10% of RDV per serving

Kiwifruit or gold kiwifruit has following health benefits:

- 1. Great source of Vitamin C supports immune system to help reduce the duration & severity of colds & flu, reduce tiredness and fatigue and support collagen formation that is essential for healthy skin, teeth & bones.
- 2. Good level of vitamin E & polyphenols contained in gold kiwifruit have an antioxidant effect.
- 3. Largely due to the unique hydration properties of kiwifruit dietary fibre that swells to nearly three (3) times its original size makes uptake of sugars into the bloodstream steadier, thus has low glycemic index.
- 4. The kiwifruit dietary fibre namely hemicellulose, cellulose and pectin supports the digestive health by helping to bulk up stool, improve transit time and act as a prebiotic by getting fermented in the colon by the good bacteria that reside there.
- 5. Since rich in potassium, a mineral that helps maintain muscle function and supports healthy metabolism, water balance, electrolytic functions and the nervous system.
- 6. As a good source of folate, kiwifruit is ideal for the whole family. Folate is an essential nutrient for cellular growth and development which is why it is so important during pregnancy and in children.

Green & Gold Kiwifruit

Gold Kiwifruit "SunGold"

(ii). Hardy-skin or smooth-skin or fuzz free Kiwifruit varieties (*Actinidia arguta*):

- **Cold tolerant, *Actinidia arguta*** is **hardy to -23 to -32°C**.
- Hardy kiwi or smooth skin fuzz–free kiwifruit plants are **very vigorous, self-fruitful & produce a good quality highly aromatic fruit that is quite different from the fruit** of ***Actinidia deliciosa***.
- Smooth skinned (skin can be eaten) fruits are of the size of large grapes, **generally green in color and much smoother than the Fuzzy types**.
- The **flavor is excellent** but **varies by cultivars**.
- **Vitamin C content is very good at 10-70 mg per 100 gms fresh fruit.**
- Hardy kiwifruits are an **inch or so long which are borne in clusters** and **being smooth the skin is edible so can be eaten just like grapes**.
- The **hardy kiwifruit has same emerald green interior and similar flavor to the grocery store Kiwifruit except hardy Kiwifruits are sweeter**.
- Less pruning is required because of early fruiting that as can bear fruits in the first year after plantation & spur type growth.
- **Some of the popular varieties are Issai, Prolific & Ken's Red.**

Hardy kiwifruit “Issai”

Hardy kiwifruit “Prolific”

Hardy kiwifruit “Ken’s Red”

(iii). Kolomitka (*Actinidia kolokitka*) kiwifruit:

- Kolomitka kiwifruit (*Actinidia kolomitka*) also known as Arctic kiwi are hardy to -40°F (-40°C) but shoots are sensitive to frost damage.
- Available cultivars differ greatly in fruit shape, size, colour & flavor. Fruits of k*olomitka* are smaller than those of *arguta* kiwivines.
- Plants are considered good ornamentals because of their variegated pink leaves, particularly in the male.
- Small to medium in size fruits are very sweet with good aroma & flavor.
- Fruits are valued for their exceptionally high Vitamin C content i.e. 700-1000 mg / 100 grams of fruit (10 times higher than Hayward & 20 times higher than citrus). This specie is probably more sensitive to the wet soil or phytophthora root rot. There are also reports that *A. kolomitka* requires shade for optimal growth. The varieties are Ananasnaya Michurina or Anna, Arnold A, Krupnopladnaya, Red Beauty & Pautske and Arctic Beauty (vigorous male) & *Actinidia kolomitka* male as pollenizers.

Mango:

S. No.	Variety/ hybrid	Plant vigor & spacing	Bearing pattern	Peel character-ristics	Diseases & insect pest resistance	Yield	Remarks
01.	Pusa Lalima (Dashehari x Sensation)	Semi dwarf or semi vigorous 6 x 6 mtr	Regular & precocious	Bright jasper red peel	Moderately tolerant to hopper & mealy bug	Higher than Dashahari	Excellent sugar acid blend & good shelf life. The red peel color on yellowish green background makes it very appealing
02.	Pusa Arunima (Amarpali x Sensation)	Semi vigorous 6 x 6 mtr	Regular	Attractive red & thick peel	---	High yielding 40 Kg/ tree. TSS is around 20°B	Thick peel may result in less of fruit fly infestation. Late maturing variety having good shelf life.
03.	Pusa Peeta-mber (Amarpali x Lal Sundari)	Medium in vigor 6 x 6 mtr	Regular bear fruits in 4th year	Bright yellow peel	Moderately resistant to mango malformation major insect-pests.	Higher than Dashahari	Shelf life is good
04.	Pusa Pratibha (Dashehari x Amarpali)	Semi vigorous 6 x 6 mtr	Regular bear fruits in 4th year	Bright red peel	---	Higher than Dashahari	Shelf life is good, yellow orange pulp. Very appealing to the buyers.

Continued…… Mango

S. No.	Variety/ hybrid	Plant vigor & spacing	Bearing pattern	Peel character-ristics	Diseases & insect pest resistance	Yield	Remarks
05.	Pusa Shresh-ath (Amarpali x Sensation)	Semi vigorous 6 x 6 mtr	Regular bear fruits in 4th year	Red peel	Moderately tolerant to hopper & mealy bug		Due to elongated shape suitable for uniform packaging. Pulp is of orange color
06.	Ambika (Amrapali x Janardan Pasand)	Semi-spreading	Regular bearer	Red peel		Late in maturity. 80 kg per plant at age of 10 years. TSS of 21°B	Has wide adaptability and is performing well in climatologically contrasting regions.
07.	Arunika (Amrapali x Vanraj)	Dwarf to Medium in vigor 5 x 5 mtr	Regular bearer	Red peel		Late in maturity. TSS is around 24°B	
08.	Barah-masi (All season mango)	Precocious & tree is medium to large in size	Blooms 2-3 times a year	--	--	--	Sweet, fragrant & delicious in flavor
09.	Bowen seedling		Bears fruit in 3-4 years				Naturally poly-embryonic

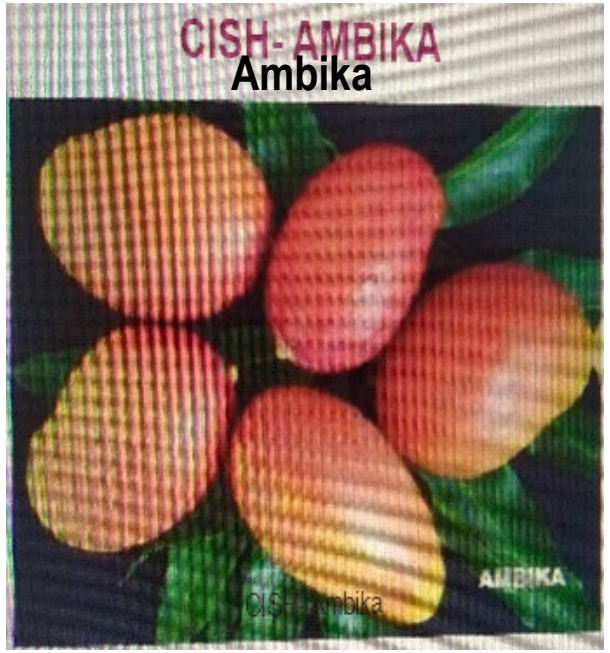

Pusa Lalima


Pusa Arunima


Pusa Peetamber


Pusa Pratibha


Pusa Shrestha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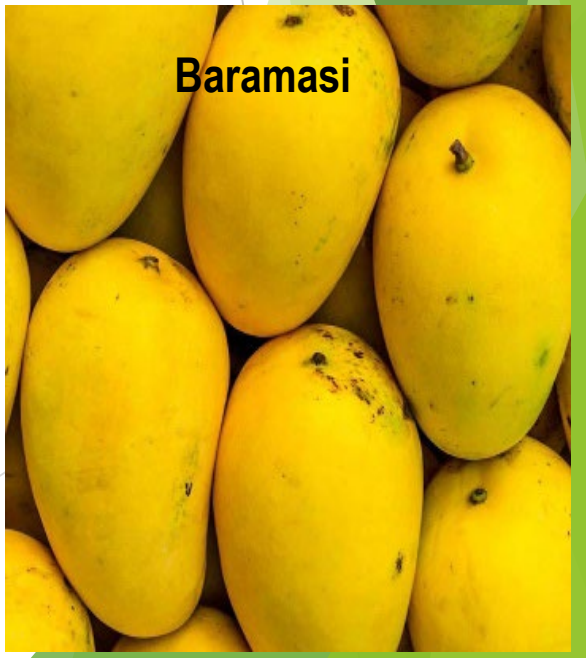
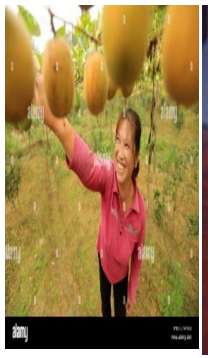
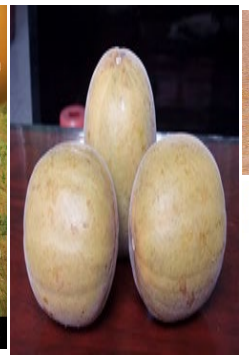

Baramasi

Jamun:

S. No.	Variety / hybrid	Plant vigor & spacing	Characteristics	Yield	Remarks
01.	CISH J-37 (Jamwant)	Tree height of 12-15 mtr	Mid-season maturity during the second week of June (Lucknow conditions). Fruit is oblong and has average weight of 24.05 gm, length of 3.90 cm & diameter of 3.03 cm.	200-300 kg per tree of 65 years age	Pulp content is 92.26% & TSS is 16.4°B. Ascorbic acid content is 49.88 mg / 100 gm & total antioxidant value of 38.30 mg / g.
02.	CISH-42	Tree height of 10-11.5 mtr	Seedless mid-season maturing during the second week of June (Lucknow conditions). Fruit is round in shape. Average fruit weight is 6.87 gm & length is 2.57 cm.	180-250 kg per tree of 65 years age	Pulp content is 97.90 % with almost rudimentary seed & TSS is 14.7°B. Ascorbic acid content is 34.14 mg / 100 gm & total antioxidant value of 15.54 mg / g & has a better shelf life.

Monk Fruit: Monk fruit i.e. *Siraitia grosvenorii*, a unique herbaceous perennial plant belongs to the cucurbitaceae family & is a small sub-tropical melon. Native to the southern parts of China, in China, it is commonly known as Luo Han Guo, Arhat fruit and Buddha fruit. Its unique low calorie intense sweetness comes from naturally occuring antioxidants found in this delicious fruit. Used as a food ingredient, monk fruit adds delicious low calorie sweetness, replacing sugar and calories with great tasting goodness. Because of the intense sweetness of that results primarily from the content of a group of cucurbitane - type triterpene glycosides known as mogrosides, monk fruit is known throughout the world. Among them, mogroside-V is extremely sweet. The extracted mixture of mogrosides is 150 to 250 times sweeter than the table sugar or cane sugar. Monk fruit juice is amazingly twenty (20) times sweeter than other fruit juices. Monk fruit has been used for centuries in traditional Chinese medicines for the treatment of cough, sore throat, and minor stomach and intestinal troubles. The extracts of monk fruit also have specific biological properties, including anti-tumor, antidiabetic, anti-infammatory and anti-oxidative. Monk fruit has been used for centuries in traditional Chinese medicines for the treatment of cough, sore throat, and minor stomach and intestinal troubles. The extracts of monk fruit also have specific biological properties, including anti-tumor, antidiabetic, anti-infammatory and anti-oxidative.





8. Challenges or constraints in cultivation / adoption / marketing / processing in some of new highly remunerative, healthy & super fruits:

Crops	Quality seeds	Technology	Irrigation	Area Expansion	Cropping intensity	Storage	Processing	Value chain
Color varieties of mango that are dwarf, late & regular bearer.	It's a constraint that can be overcome easily.	Not a challenge or constraint.	To be created under water shed.	Should not be a challenge or a constraint.	100%	Since shall be out of season in Himachal Pradesh, so I don't think that storage will be required.	Since the crop is expected to fetch quite good prices, so shall not be required.	Should not be a challenge or constraint.
Dragon fruit	Best varieties need to be imported as presently it's a constraint.	Not a challenge or constraint.	If available, shall give better produce qualitatively & quantitatively.	Should not be a challenge or constraint.	100%	--do--. Though many cold storages are being developed in private sector.	Not a challenge or constraint.	Could be a constraint but not a challenge.
Blueberry	It's a constraint but not a challenge.	Not a challenge or constraint.	To be created under water shed.	Should not be a challenge or constraint.	100%	Shouldn't be a challenge or constraint as many cold storages are being developed in private sector.	Not a challenge or constraint in general for frozen blueberries', it shall be a challenge or constraint.	Could be a constraint but not a challenge.

Continued…..

Challenges or constraints in cultivation / adoption / marketing / processing in some of new highly remunerative, healthy & super fruits:

Crops	Quality seeds	Technology	Irrigation	Area Expansion	Cropping intensity	Storage	Processing	Value chain
Macada-mia nut	It's a constraint but not a challenge.	Not a challenge or constraint.	To be created under water shed.	Should not be a challenge or constraint.	100%	Since it is a nut, so should not be a challenge or constraint.	Not much of processing is required.	Should not be a challenge or constraint.
Avocado	It's a constraint but not a challenge.	Not a challenge or constraint.	To be created under water shed.	Should not be a challenge or constraint.	100%	Shouldn't be a challenge or constraint as many cold storages are being developed in private sector.	Not much of processing shall be required during the initial years of production.	Should not be a challenge or constraint.
Monk fruit	Should not be a challenge or constraint.	Not a challenge or constraint.	To be created under water shed.	Should not be a challenge or constraint.	100%	Shouldn't be a challenge or constraint as many cold storages are being developed in private sector.	Not much of processing is required. But if monk fruit juice concentrate has to be manufactured then it shall be a constraint.	Should not be a challenge or constraint.

Continued…..

Challenges or constraints in cultivation / adoption / marketing / processing in some of new highly remunerative, healthy & super fruits:

Crops	Quality seeds	Technology	Irrigation	Area Expansion	Cropping intensity	Storage	Processing	Value chain
Jamun	Not challenging & a constraint.	Not a challenge or constraint.	Though better performs as rain-fed, but the assured irrigation to be created under Watershed could be advantageous.	Should not pose any challenge or constraint.	100%	Its short shelf life could be a challenge or constraint.	Frozen fruits or vegetables processing / preservation could be a challenge or constraint.	Could be a constraint but not a challenge.
Gold Kiwifruit	It's a constraint but not a challenge.	Not a challenge or constraint.	To be created under water shed.	Should not pose any challenge or constraint.	100%	It's not a challenge or constraint.	Not a challenge or constraint.	Could be a constraint but not a challenge.
Kolomi-tka Kiwifruit	It's a constraint but could not be a challenge.	Not a challenge or constraint.	To be created under water shed.	Should not pose any challenge or constraint.	100%	Shouldn't be a challenge or constraint as many cold storages are being developed in private sector.	Not a challenge or constraint.	Could be a constraint but not a challenge.
Strawber ry	Some new varieties need to be introduced from within the country.	Not a challenge or constraint.	To be created under water shed.	Should not pose any challenge or constraint.	100%	Lack of storage facility could be a constraint for this highly perishable crop. But it can't be a challenge.	Not a challenge or constraint.	Could be a constraint but not a challenge.

9. Case studies available on the success stories and frameworks for upscaling in other regions / areas.

Some pics of installed micro irrigation systems

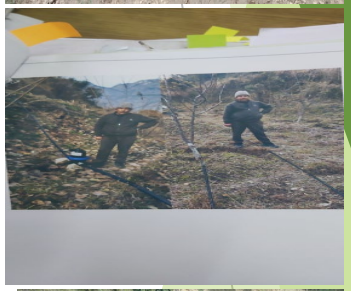










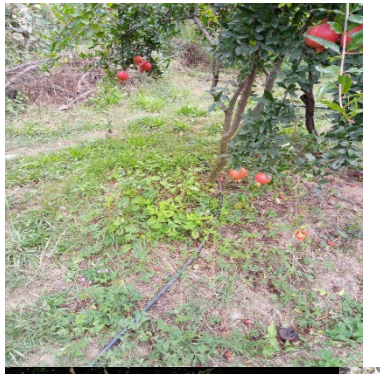



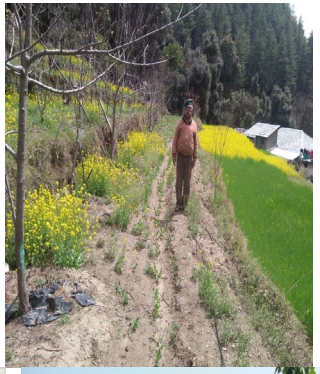
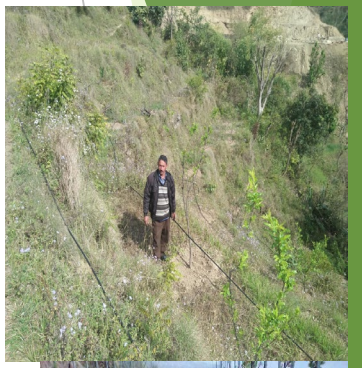




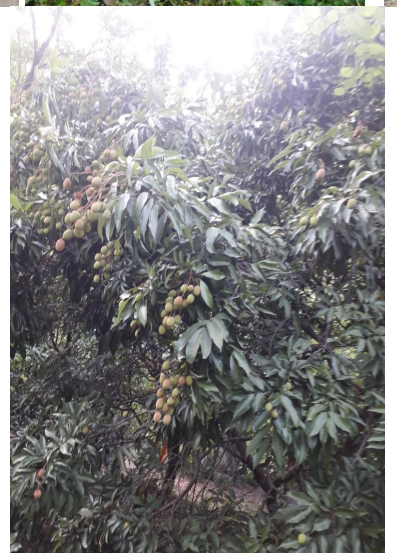
Continued…..

Some pics of installed micro irrigation systems





This was all about!

Thank you all!