Role of youth for accelerating agricultural growth

Raj Paroda

The Context

From Bengal Famine and Bagging Bowl status to an era of Food Self Sufficiency or (for 1.37 billion people)

From an Importing to an Exporting Country (> US$ 40 billion)

Became possible due to :

Green, White and Blue Revolutions

80% farmers are smallholders (having <2 ha)

Agricultural Revolution

Impact

- **Six fold increase in food grains production**

(50 mt – 308.0 mt)

- **Horticulture production > 320 mt**

- **As against four fold increase in population (From 330 m – 1.39 billion)**

- **Reduced poverty (From 70% - 20%)**
- **Buffer stock > 70 mt ; Export > 20 mt**
- **Life expectancy also doubled**

(From 32 - 68 years)

OTHER REVOLUTIONS

White (Milk)	• 17 MT in 1950-51 • 198 MT in 2019-20	 X10
Golden (Horticulture)	• 95.4 MT 1991-92 • 320 MT 2020-1921	 X3
Blue (Fish)	• 0.75 MT 1950-51 • 13.4 MT 2019-20	 X14

India's Global Position

Commodity	India (m tons)	World (m tons)	% world share	Rank in the world
Rice	118	741	14.8	2
Wheat	107	716	13.7	2
Pulses	23	73	31.5	1
Rapeseed	8.7	72.7	10.9	3
Groundnut (in shell)	9.3	46	16.5	2
Fruits (no melons)	86	677	12.7	2
Vegetables & Melons	167	1136	14.7	2
Sugarcane	358	1911	16.0	2
Meat (000 MT)	6215	310380	2.0	6
Milk (000 MT)	184491	746708	20.8	1

INDIAN NARS

- One of the strongest NARS
- ICAR and DARE (Reorganized in 1972)
- 104 ICAR Institutes + 71 Universities
- Research, Education and Extension
(under same umbrella)

PCAARRD, PARC, NARC, BARC, CARP were established on ICAR model but still lack the status and unification

THUS, WE NEED TO REORIENT INDIAN AGRICULTURE?

DESPITE THESE REVOLUTIONS – Doubling farmer's income ?

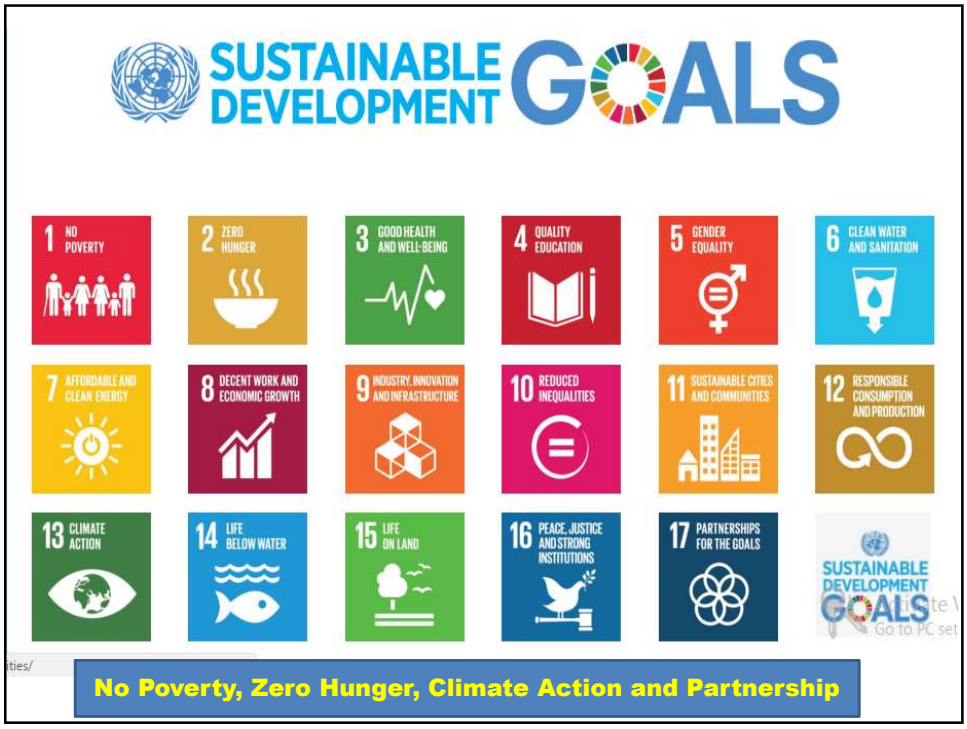
CHALLENGES

SDG RELATED:	FARMER RELATED:
- Poverty	- Low Income ?
- Hunger	- Youth Not Interested
- Malnutrition	- Policy Support ?
- Climate Change	

Second Generation Problems of Green Revolution

- **Factor Productivity Decline**
- **Decline in Soil Health and Water Table**
- **Macro-nutrient Imbalance & Micro-nutrient Deficiency**
- **Increased Incidence of Diseases and Pests**
- **Dependence on Costly inputs & Reduced Farm Profitability**
- **Higher Labor Cost – Shift Towards Farm Mechanization**

Moreover, Complacency seemed to have crept in



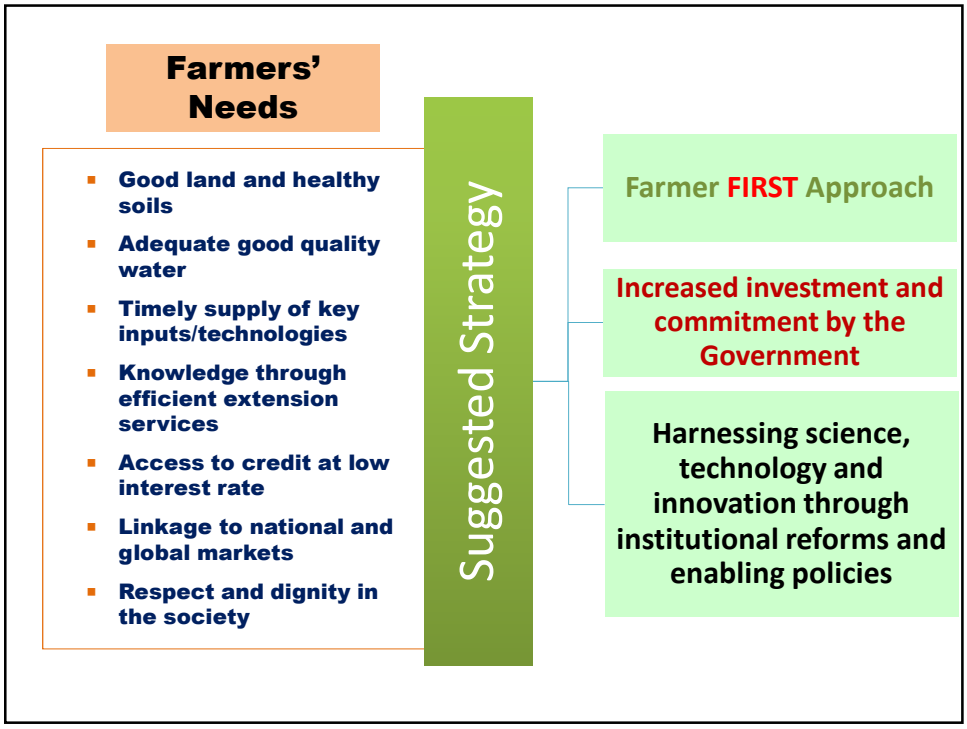
SDG 1&2: Poverty and Hunger

India's GHI : 96th out of 107

40% children below 5 years are undernourished

India has maximum concentration of people below poverty line : >200 m

WAY FORWARD



Challenges being faced by Youth

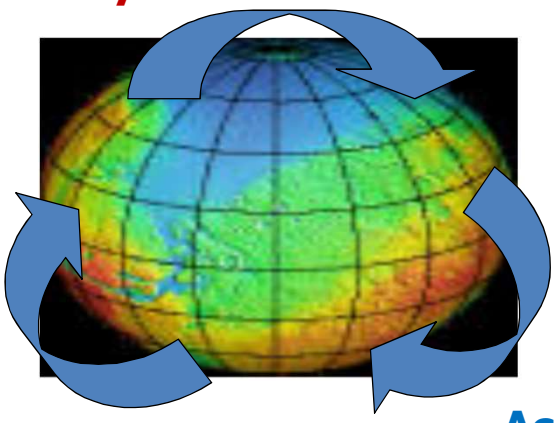
- **Lack of access to good knowledge resulting in failure of new initiatives - needing institutional back up**
- **No exposure to agriculture in schools – NEP is a hope**
- **Limited access to land - small land holdings**
- **Lack of financial resources**
- **Difficulties in linking to markets**
- **Little voice in decision-making**
- **Poor social image of agriculture and lack of infrastructure facilities in rural areas**
- **There exists 'aspiration-attainment gap' due to lack of hand holding, mentorship and funding support**

Youth – Our Strength

- **Global population is expected to be 9 billion by 2050; youth around 20 %**
- **India has a comparative advantage over other countries with 356 million youth between 10-24 years age group; nearly 200 million living in rural areas**
- **India's population is expected to remain young longer than that of China and Indonesia**
- **Average age of the Indian population is 30 years, as against 40 in USA, 46 in Europe and 47 in Japan**
- **Agriculture is a key sector, sustaining around 55 % of India's population**
- **Youth and agriculture are the twin pillars for achieving SDGs**

Need to Act

Think Globally



Act Locally

Global/Regional Initiatives

- **Challenge to retain youth in agriculture first figured prominently during the Global Conference organized by GFAR in New Delhi - 2006.**
- **An international forum of Young Professionals for Agricultural Development (YPARD) was launched under the umbrella of GFAR at FAO, Rome**
- **The importance of youth in agriculture was further emphasized and structurally debated during GCARD 1 and 2, organised in 2010 and 2012, respectively**
- **Regional Workshop on 'Youth and Agriculture: Challenges and Opportunities' organised in Islamabad - 2013**

GFAR

ypard

National Initiatives

- **ICAR, APAARI and TAAS organized a national workshop on 'Foresight and Future Pathways of Agricultural Research through Involvement of Youth in India' at New Delhi - 2013 – Led to ARYA program by ICAR**
- **Regional Conference on Motivating and Attracting Youth in Agriculture (MAYA) organised in New Delhi - 2018.**
- **Zonal Workshop on Youth as Torch Bearers of Business Oriented Agriculture in South India organised by TAAS and PJTSAU, Hyderabad - 2019.**
- **Zonal Workshop on Promoting and Attracting Youth in Agriculture in North India organised by TAAS and PAU at Ludhiana- 2020**

Motivating & Attracting Youth in Agriculture (MAYA)

To be Job Creator and not Job Seeker:

- Youth (including women) as extension agents – Paid extension

- Youth as input providers

-Youth as Entrepreneurs

MAYA - Road Map

- Separate **'Department of Youth in Agriculture'**
- Establish a **'National Mission on Youth in Agriculture'**
- Encourage youth to set-up **agri-service centres**
- **Encourage youth to get involved in e-NAM, start-up, stand-up and skill development schemes, agri-business enterprises, FPOs etc**
- Need for paradigm shift from narrow focus on **'youth as a farmer'** to **'youth as a value chain developer'** to harness better economic opportunities
- **Govt. to provide enabling policy environment** for long-term investments, easy and soft credit availability, provision of subsidy to entrepreneurs, easy market linkage, land, water and market law reforms, and tax exemption for rural-based primary value addition by youth
- **The private sector to help create an 'Agri-Youth Innovation Corpus Fund' and facilitation for creation of Agri-Clinics under corporate social responsibility (CSR)**

Govt. Initiatives on Youth

- A program on Attracting and Retaining Youth in Agriculture (ARYA) functioning under ICAR since 2013
- Student READY (Rural Entrepreneurship Awareness Development Yojana) program initiated by ICAR in 2015-16 by reorienting rural agricultural work experience (RAWE) program
- Start-up India - Ministry of Commerce and Industry initiative - since January 2016
- Stand-up India - initiative by the Department of Financial Services (DFS) to encourage youth from scheduled caste and scheduled tribes to become entrepreneurs
- National Skill Development Mission - launched for creating convergence across various sectors and different states with respect to activities relating to skills training

Govt. Initiatives on Youth

- Make in India - Ministry of Commerce and Industry, launched in September 2014
- Skill India Mission – launched in September 2014; Ministry of Skill Development and Entrepreneurship
- Pradhan Mantri Kaushal Vikas Yojana (PMKVY)- by the Ministry of Skill Development and Entrepreneurship to provide the country's youth training for meaningful industry-relevant skills
- PM-YUVA- (Yuva Udyamita Vikas Abhiyan) - It is a centrally-sponsored scheme related to entrepreneurship, education and training for youth (both men and women).

Youth for Secure and Sustainable Agriculture

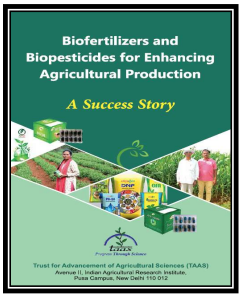
Options:

- Agricultural Diversification
- Secondary Agriculture
- Specialty Agriculture
- From Production to Post-production (value chain)

Consolidating the gains

Dr. Basavaraj Girennavar:

Success Story of an Entrepreneur



- Managing Director, Criyagen Agri and Biotech-
- Ph.D. from Texas A&M ; Unsuccessful Venture in USA in 2007 Reinitiated venture in 2008 in India
- Institutional Support for Success: Incubation Center with well Equipped Laboratory by UAS Dharwad
- End to End Solutions to Farmers: Conception in USA – Evolution in Dharwad- Expansion and Innovation in GKVK Banglore
- Responsible Entrepreneurship: Rejuvenate Soil, Sustain Productivity, Profitability and Ensure Food Security
- Criyagen AgriApp: ICT tool for knowledge and Information sharing with Farmers- 5 lakh farmers using the app
- First Biofertilizer Product in 2009: Dynamic Nutrient Provider (DNP)- reached to 22,000 tons in 11 years
- Patents: DNP-16 (151 countries), Zen-bio and Bio Maxx Fertilizer
- More than 50 Products: Bio-NPK, Bio-Humate, etc
- Yield almost double using biofertilizers, Free Soil Health Testing,
- Financial: In 11 years - from 0 to almost 35 Crore industry
- Awards and Recognition: Udyog Ratan Award

Sultan Singh

Managing Director, Sultan Fish Seed Farm, Karnal

Fish Farming - A Success Story

- **In spite resistance, he could manage 5 acres of barren land for fish farming**
- **Invested Rs 28,000/- and earned 1, 62,000/-this gave him much needed confidence to move forward**
- **Realized that major challenge was availability of fish seed**
- **His efforts benefited *Gram Panchayat's* pond - earning between 5 - 15 lakh annually.**
- **Got knowledge from CIFE, CIFT, CIFA, CIFRI, KVK**
- **Opened fish retail store 'FISH BITE' like Mc Donald/KFC**
- **Around 1000 students annually visit Sultan Fish Seed Farm**

- **In 1984, established Fish Feeding Farm on 3 acres**
- **Species bred:**
  IMC (Indian Major Carps): Catla , Rohu, Mrigal
  CMC (Chinese Major Carps): Grass Carp, Silver Carp

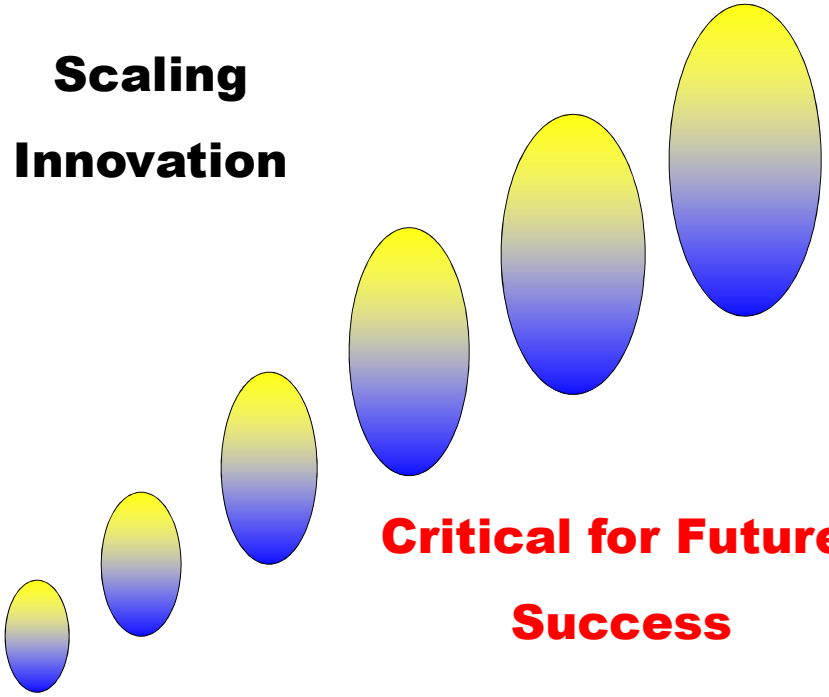
- **Production of Hatchery:**
  IMC & CMC Species : Spawn 60 Crores – largest supplier
- **Production in Recirculatory Aquaculture System (RAS):**
  2018: IMC & CMC Carps (45.6 tons); 2019 : Shingi (42 tons);
  2020: Pangasius (58.8 tons); Catfish (67.5 tons)
- ***He is known to have revolutionized fish farming in North India***
- ***He received Padma Shri in 2019***

Elements of Success

Institutional Backstopping
Mentor – Hand holding
Market Need Assessment
Easy Credit
Strong Will & Perseverance

Scaling

Innovation



Critical for Future Success

Biofortified Hybrids

AHB 1200
High Iron = 77 ppm
Zinc = 39ppm

HHB 299
High Iron = 73 ppm
Zinc = 41ppm

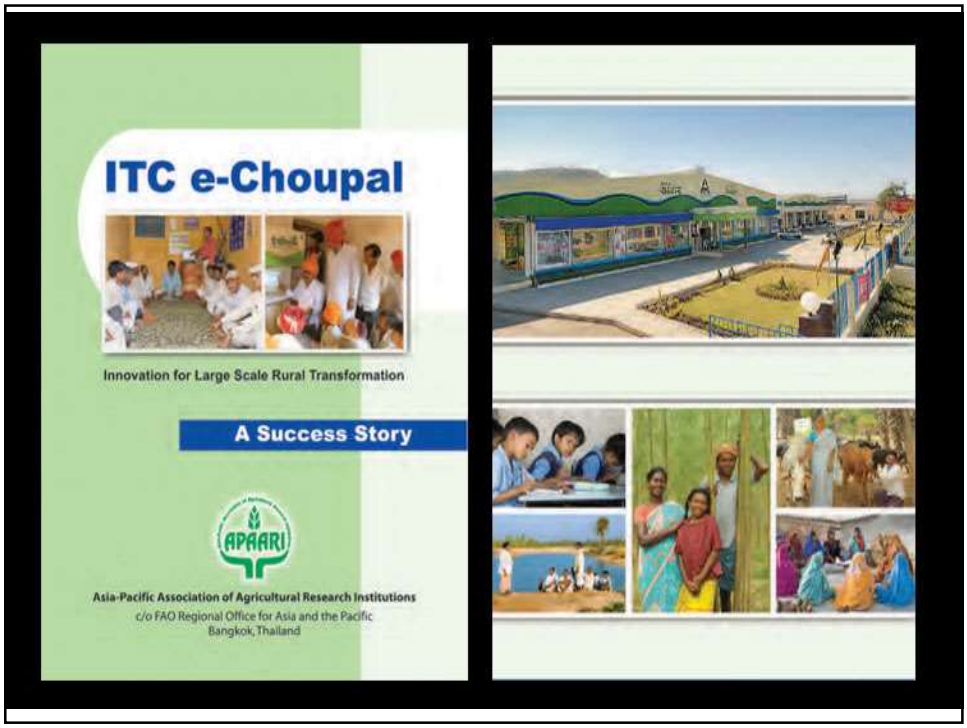
HHB 311
High Iron = 83 ppm
Zinc = 39 ppm

Source : Dr. C. Tara Satyavathi , 2019

GENOME EDITED BANANA

- India is the largest producer of banana (26% of world's production)
- Banana available round the year
- Cultivated varieties are sterile, hence biotechnological tool like Crisper/Cas9 useful

At NABI, Mohali cultivar Grand Naine has been improved through Crisper/cas9, to six fold increase in β-carotene (pro-vitamin A) content. (Kaur et al. 2020, Metabolic Engineering)



Scaling Innovations

- **Hybrid Technology (maize, bajra, sorghum, rice)**
- **Biotechnology - GM crops (soybean, mustard, maize, brinjal)**
- **Conservation Agriculture (>20 mha)**
- **Protected Cultivation (expand area to 0.5 m ha)**
- **Micro-irrigation (discourage use of flood irrigation)**
- **Bioenergy/Biofuel (use of sugar cane and maize up to 20%)**
- **Biofortified Crops (Quality protein maize, iron & zinc rich rice, iron rich bajra, zinc rich wheat)**
- **ICT for Knowledge Empowerment**

Options Available - A Fifteen Point Agenda

1. Improved seed production - Hybrids
2. Certified nursery for quality plants
3. Knowledge sharing through ICT
4. Paid extension services
5. Quality input supply
6. Farm mechanization – Custom Hire Centres (CHCs)
7. AGRI-CLINICS
8. Post-harvest processing and value addition
9. Micro-irrigation
10. Contract farming – FPOs
11. Protected cultivation
12. Conservation agriculture
13. Accredited Laboratories – Soil and water analysis, Organic produce, Seed quality, Biofertilizers, pesticides & Biopesticides
14. Inland fishery – including spawn production
15. Flower production - including seed production

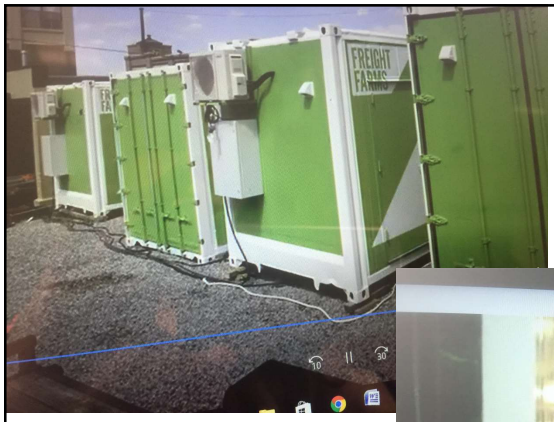
Conservation Agriculture

Area covered : 3.5 m ha

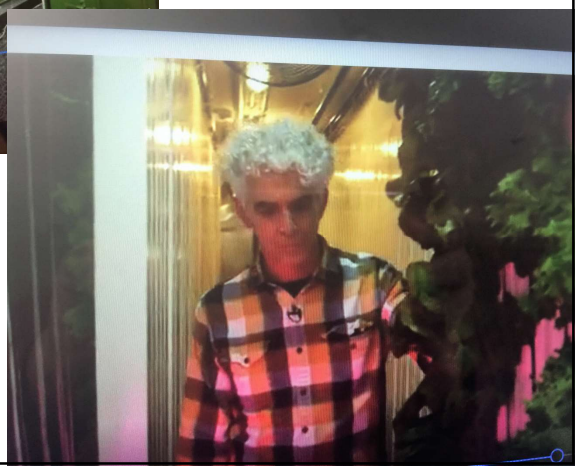
Potential area : 10 m ha (R-W alone)

Protected Cultivation

India - (50 th ha) China - (2.0 m ha)



Are Shipping Containers the Future of Farming?



One repurposed Shipping Container can grow 2 Acre's worth of produce

Shift : Precision Farming

Use of Decision Support Systems

Arid Horticulture : Personal Experience

Governance and Administrative Reforms

Value addition needed

Food industry

- Hybrids/varieties with high semolina recovery & high amylose/amylopectin ratio

Feed industry

- High protein digestibility; Low phytates

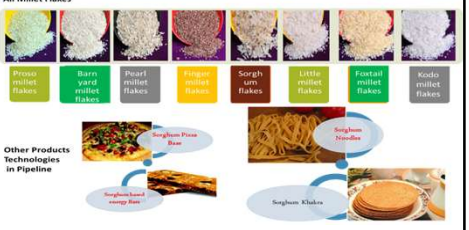
Ethanol industry

- High starch; High ethanol fermentation efficiency

Millet Recipes

Developed **85 millet based recipes** that comes under different categories like breakfast, lunch, sweets and savories to include in our daily diet.

Other Value added Millet Technologies – Offered for technology licensing



Packaging & Labelling

eatrite

Seed Spices – Value addition

- **Diversification through seed spices**
- **Seed production**
- **Organic farming**
- **Processing & value addition**
- **Export of seed spices**

Source: Dr Gopal Lal, NRCSS

Enhancing Income from Goat Milk

- Goat milk is nutritionally superior to cow milk having 12.6 % total solid, 3.8 % fat, total protein 4.8%, lactose 3.7% and ash 0.8%
- The essential minerals like Ca, K, Fe, Mg, P, and Cu are significantly higher in goat milk
- Average shelf life of goat milk is 5-7 hr, 11-14 hrs and 9-13 hrs during summer, autumn and winter, respectively. Goat milk can be processed into different products like paneer, kulfee, flavoured whey drink etc.

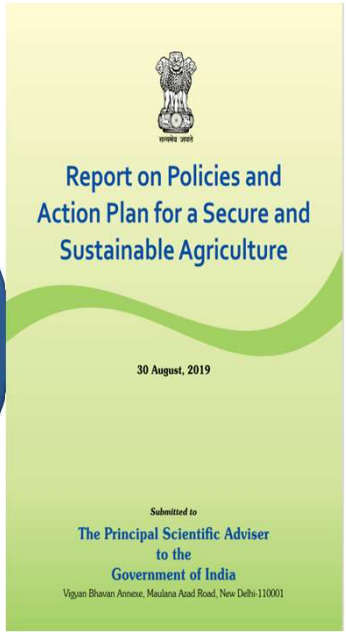
Value added products

***Aloe vera* cultivation**

Prosopis juliflora : Feed block/mixture

- To prepare multi block/mixture mixtures, clusterbean meal replaced by *P. Juliflora* seed meal
- The feed block/nutrient mixture supplementation in the animals increased feed intake, regulated rumination, corrected pica, regularized the breeding cycle and improved fertility
- Supplementation of these feed blocks and nutrient mixture increased daily milk yield (20-25 %) in cattle and buffalo maintained under grazing conditions

Committee on Agriculture



Future Road Map

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Finally, Towards a Better Future, Good Health & Prosperity

THANK YOU