CHAPTER 5 - CONTRIBUTION OF AGRICULTURE EXPERTS
Contribution of Agriculture Experts

1. **Dr. M. S. Swaminathan:**
   - Wheat breeder
   - Father of *Green Revolution* in India,
   - Ex. Member of Planning Commission
   - **World Food Prize** (1987) given by FAO
   - Was honored as a 'Millennium prize' by former Prime Minister A. B. Vajpai in 80 National Science Congress held on 3-7 Jan, 2001 at IARI, New Delhi.
   - Ex. President of *National Commission on Farmers of India*.
   - The book entitled "*Wheat Revolution*" Written by him.

2. **Dr. N. E. Borlaug:**
   - Father of 'Green Revolution' in World
   - He was American wheat scientist (Plant Pathologist) Awarded Noble Peace Prize in 1970.

3. **Verges Kurien:**
   - Father of *White Revolution* in India
   - Ex. Chairman of *NDDB*, Anand (Gujarat)
   - Got 'World Food Prize' in 1989.

4. **S. K. Vashal:**
   - Maize breeder working at CIMMYT.
   - Awarded" World Food Prize" in the year 2000 for research on QPM (maize rich in amino acids *tryptophan* and *lysine* along with Dr. E. Villegas.

5. **Dr. K. L. Chadda:**
   - Pomologist
   - Father of 'Golden Revolution' in India.

6. **Dr. R. S. Paroda:**
   - Forage Breeder
• Ex. D.G. of ICAR

7. **Amrita Patel:**
   - Chairperson of NDDB, Anand

8. **Sanjay Raja Ram:**
   - International wheat breeder.

9. **Dr. G. S. Khush:**
   - Rice breeder.
   - He was awarded 'Wolf Prize' for agriculture, 2000 for his extra ordinary contribution to plant breeding and genetics especially in rice.

**Crop Improve Achievements:**

a) **Genetically Modified Crops:**
   - The crops in which one or many of its traits are altered or enhanced through a process of **genetic engineering** known as GM crops i.e. Bt. Cotton developed against cotton boll worms.
   - **Bacillus thuringensis** is a soil bacterium that produces proteins lethal to insect larvae affecting the digestive system of boll worms.
   - The gene responsible for this effect is **Cry-I Ac**.
   - **GM cotton** is only crop permitted by Genetic Engineering Approval Committee (GEAC) under Ministry of Environment and Forests. first permitted on March, 2002.
   - Bt. Cotton varieties developed by Mahyco: MECH-12, MECH162, MECH-184 for Southern States and RCH-134, RCH-138 suitable for Northern India.
   - Mahyco collaborated with Monsanto to develop Bt. Variety **Bollgourd-I**, using Cry-I Ac gene.
   - Recently Bt. Variety developed as **Bollgourd-II**, having both genes of Cry I Ac and Cry 2 Ab gene.
   - First transgenic crop was: Bt. **Tobacco(1987)**
• Country having first position for transgenic plants is: USA
• Rank of India for transgenic crops in the world (2016) is: Fifth (USA > Brazil > Argentina > Canada > India)
• The position of transgenic plants in world (in area): Soyabean (>60 %) > Maize > Cotton > Canola.
• Mostly GM traits are used as herbicides resistant traits followed by quality improvements and insecticides resistant traits

b) Genetically modified mustard:
• These are glyphosate resistant mustard developed by Pro-Agro Seed Company Ltd. (an ancillary company of Bayer agro Crop Science, Germany).
• Project on Indian mustard oil with higher B-carotene is initiated by TERI (Tata Energy Research Institute).
• Varieties developed of Brassica juncea at TERI are: TERI - unnat and TERI - uttam.

c) Golden Rice:
• It is genetically modified rice.
• Haung β-carotene (precursor of Vit-A) rich rice.

d) Super Rice:
• Developed by Dr. Gurdev Singh Khush at IRRI, which would bring an improvement of 25% of over present day varieties.

e) Hybrid Rice:
• 1st time in World China developed hybrid rice in 1974 by Prof. Long Ping Yuan, hence known as 'Father of Hybrid Rice'.
India is second to develop hybrid rice after China, first varieties i.e. MGR-I (earlier named as CoRH-1) developed first by TNAU, Coimbatore and PRH-I & PRH-6 developed by IARI.

f) Hybrid Mustard:
- Developed by DRMR (Directorate of Rapeseed and Mustard Research), Bharatpur (Rajasthan)
- Varieties developed by DRMR are: NRC-HB-506 (first hybrid mustard in India).
- Other is: NRC-HB-IOI

g) Super Wheat:
- The research on super wheat is in progress at DWR, Karnal
- It was expected to come by 2005, yield increase 15-20 per cent

h) Green Revolution:
- The term green revolution was coined by William S. Gaud in 1968 of USAID; to describe the productivity based improvement in food production particularly in wheat and rice.
- Main components in green revolution are High yielding varieties, use of chemical fertilizers and plant protection chemicals

i) Ever Green Revolution:
- This term was coined by Dr. M S. Swaminathan to denote the green revolution based on sustainable methods of crop intensification and diversification.

j) Vertical Revolution in Agriculture:
- Maximizing production per unit land area per unit of time using intensive cropping system, high production inputs and improved management practices.
k) Other Revolutions in Agriculture:

<table>
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<tr>
<th>Revolution:</th>
<th>Related to</th>
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<tbody>
<tr>
<td>1. White Revolution</td>
<td>Milk Production</td>
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<td>2. Blue Revolution:</td>
<td>Fish Production</td>
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<td>3. Brown Revolution:</td>
<td>Food Processing</td>
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<td>4. Grey Revolution</td>
<td>Fertilizer Production</td>
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<td>5. Yellow revolution:</td>
<td>Oil Seeds Production (mustard)</td>
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<td>6. Red Revolution</td>
<td>Tomato/Meat Production</td>
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<td>7. Pink Revolution:</td>
<td>Prawn/Onion Production</td>
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<td>8. Golden Revolution:</td>
<td>Fruit Production</td>
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<td>9. Round Production:</td>
<td>Potato Production</td>
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<td>10. Silver Revolution:</td>
<td>Egg/poultry production</td>
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<td>11. Black revolution:</td>
<td>Biofuel/Jatropha Production</td>
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<td>12. Rainbow revolution:</td>
<td>All sector of agriculture</td>
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<td>13. Prabhani revolution:</td>
<td>Okra production</td>
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India shares in World
- Total geographical area: 2.4%
- Population: 17.74%
- Livestock: 18%
- Forest: 24% (approx.)

India’s position in World Agriculture
I. First position in:

- Mango Production
- Banana Production
- Coconut Production
- Total pulses Production
- Tea and spices Production
- Livestock Production
- Cashew Production
- Papaya Production
- Total irrigated area
- Milk Production
- Jute and Allied Production
- Sapota Production

II. Second Position

- Wheat Production
- Oilseeds Production
- Vegetables Production
- Sugarcane Production
- Rice Production
- Fruits Production
- Silk Production

III. Third Position

- Tobacco Production
- Cotton Production

IV. Fourth Position

- Natural Rubber (8.92%) of the total world NR production
- Despite this India has emerged as the second largest consumer of NR after China, overtaking the United States.
- In coffee production, India has seventh positon
- Out of total production of coffee 65-70% is exported.

Position of Agriculture in India

a. Agriculture export commodity
- Rice > Cashew > Wheat > Tea > Tobacco

**b. Agriculture Import Commodity**

- Vegetable Oil > Cashew > Pulses > Fruits