Chapter 3
Organic manures and biofertilizers

The use of organic manures (farmyard manure, compost, green manure, etc.) is the oldest and most widely practised means of nutrient replenishment in India. Prior to the 1950s, organic manures were almost the only sources of soil and plant nutrition. Owing to a high animal population, farmyard manure is the most common of the organic manures. Cattle account for 90 percent of total manure production. The proportion of cattle manure available for fertilizing purposes decreased from 70 percent in the early 1970s to 30 percent in the early 1990s. The use of farmyard manure is about 2 tonnes/ha, which is much below the desired rate of 10 tonnes/ha.

At the present production level, the estimated annual production of crop residues is about 300 million tonnes. As two-thirds of all crop residues are used as animal feed, only one-third is available for direct recycling (compost making), which can add 2.5 million tonnes/year. The production of urban compost has been fluctuating around 6–7 million tonnes and the area under green manuring is about 7 million/ha.

Unlike fertilizers, the use of organic material has not increased much in the last two to three decades. The estimated annual available nutrient (NPK) contribution through organic sources is about 5 million tonnes, which could increase to 7.75 million tonnes by 2025. Thus, organic manures have a significant role to play in nutrient supply. In addition to improving soil physico-chemical properties, the supplementary and complementary use of organic manure also improves the efficiency of mineral fertilizer use.

The use of biofertilizers is of relatively recent origin. Biofertilizers consist of N fixers (*Rhizobium, Azotobacter*, blue green algae, *Azolla*), phosphate solubilizing bacteria (PSB) and fungi (*mycorrhizae*). A contribution of 20–30 kg N/ha has been reported from the use of biofertilizers. There was good growth in biofertilizer production and use in 1990s. At present, biofertilizers use is about 10 000 tonnes (Table 10).
Among biofertilizers, most growth has occurred with phosphate-solubilizing microorganisms, which account for about 45 percent of total biofertilizer production and use. Biofertilizer production and use is concentrated in Maharashtra, Tamil Nadu, Karnataka, Madhya Pradesh and Gujarat.

The Government is promoting the concept of the integrated nutrient supply system (INSS), i.e. the combined use of mineral fertilizers, organic manures and biofertilizers. Farmers are also aware of the advantage of INSS in improving soil health and crop productivity. However, the adoption of INSS is limited by the following constraints:

- increasing trend to use cow manure as a source of fuel in rural areas;
- increasing use of crop residues as animal feed;
- extra cost and time required to grow green-manure crops;
- handling problems with bulky organic manures;
- problems in timely preparation of the field when agricultural waste and green manure have to be incorporated and their decomposition awaited;
- poor and inconsistent crop response to biofertilizers.

<table>
<thead>
<tr>
<th>Year</th>
<th>Capacity</th>
<th>Production</th>
<th>Distribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>1992/93</td>
<td>5 401</td>
<td>2 005</td>
<td>1 600</td>
</tr>
<tr>
<td>1995/96</td>
<td>10 680</td>
<td>6 692</td>
<td>6 288</td>
</tr>
<tr>
<td>1998/99</td>
<td>16 446</td>
<td>8 010</td>
<td>5 065</td>
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<tr>
<td>2003/04*</td>
<td>20 000</td>
<td>12 000</td>
<td>10 000</td>
</tr>
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* Estimated