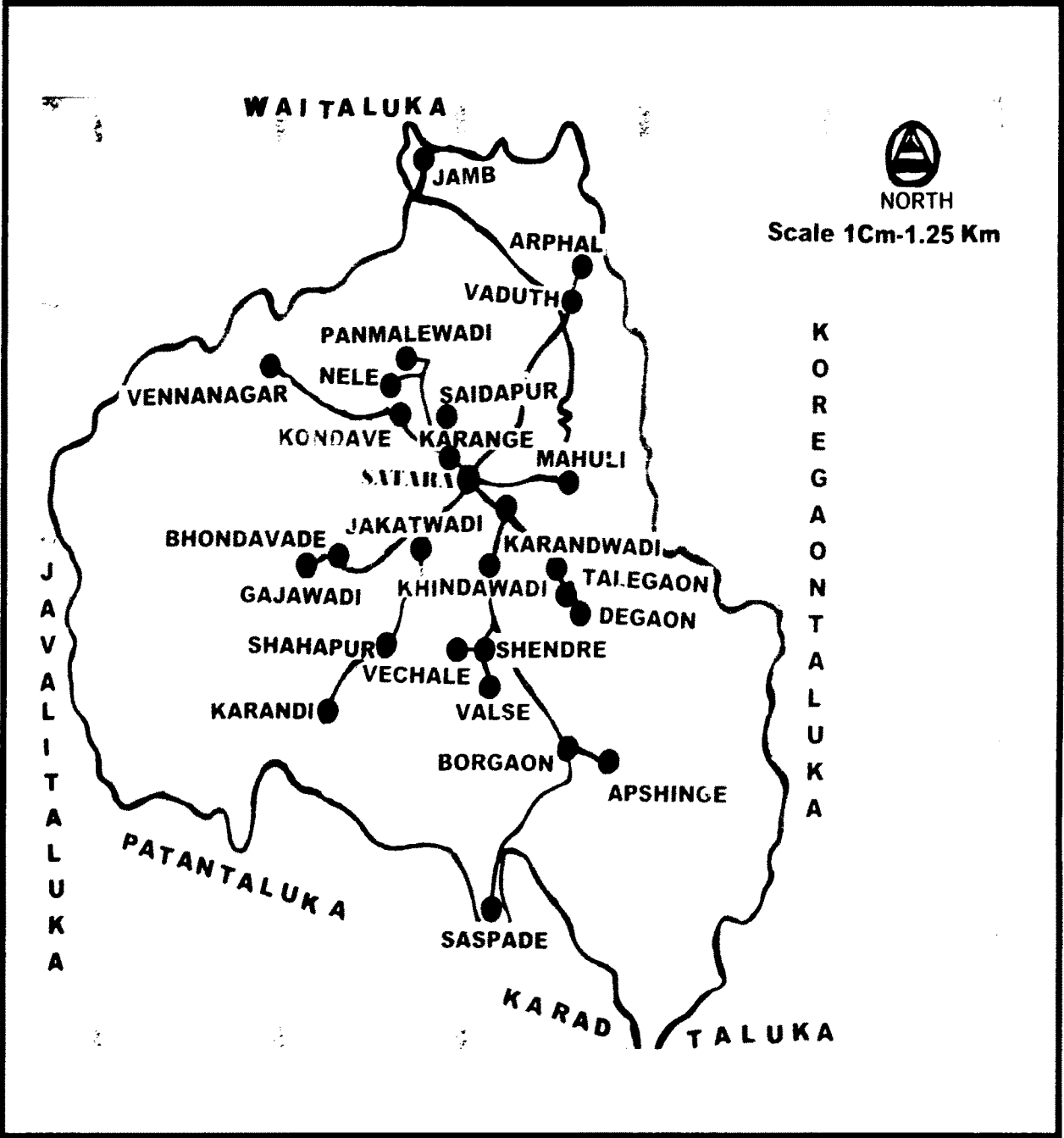


*MATERIALS*  
*AND*  
*METHODS*

**Fig.1- Map Of The Study area**



## MATERIALS AND METHODS

### a) Particulars Of The Area Surveyed

The present studies were conducted on dicot crop-weeds around Satara. Geographically Satara is situated at the foothills of Sahyadri ranges from Western Ghats. The study area lies between North latitude 17°31' and East latitude 74°3'. Average height is 773.3 meters above mean sea level. Average rainfall ranges between 900-1000 mm (Bahulekar,1984). Weed floristic studies were made on cultivators field in twenty five villages around Satara named, Apshinge, Arphal, Bhondavade, Borgaon, Gajawadi, Jakatwadi, Jamb, Karandi, karandwadi, Karange, Khindawadi, Kondave, Mahuli, Nele, Panmalewadi, Saidapur, Saspade, Shahapur, Shendre, Talegaon, Degaon, Vaduth, Valse, Vechale, Vennanagar. These fields were located at the distance about 15 km from Satara city on East, West, North and South sides (Fig. 1).

### b) General Cropping Pattern

Total area suitable for cultivation in Satara tahsil is 58669 hectares. 53600 hectares area is under Kharif crops while, 18900 hectares area is under cultivation of Rabi crops. Major crops of the area are cereals, pulses, oilseeds, vegetables etc while Sugarcane is an important cash crop. (Pathak,1999). Villages of East, South and North sides are having good irrigation facilities. Irrigation is largely due to the construction of dams on rivers like Krishna, Venna and Urmodi at Dhoni, Kanher and Parali respectively. A good network of irrigation canals in the area provides water for agriculture. The major crops in Satara tahsil are listed in Table 1.

### c) Cropping Pattern

In both kharif and rabi seasons, following dicot crop fields were visited during the present work. Chick pea (*Cicer arietinum* L.), French bean (*Phaseolus vulgaris* L.), Hyacinth bean (*Lablab purpureus* L.), Pea (*Pisum sativum* L.), Mat bean (*Phaseolus aconitifolius* Jacq.), Green gram (*Phaseolus aureus* L.), Pigeon pea (*Cajanus cajan* Millsp.), Black gram (*Phaseolus mungo* L.), Chilli (*Capsicum annum* L.), Soybean (*Glycine max* (L) merr.), Groundnut (*Arachis hypogaea* L.) [Kochhar,1981]. Visits were arranged in December and January for studying Rabi weeds and in August, September for studying Kharif weed flora. Total fields visited during the study were 250.

**Table 1: Major Crops And Area Under Cultivation In Satara Tahasil  
(2006-07) and (2007-08).**

<b>Sr. No.</b>	<b>Crop</b>	<b>Sowing area (ha.)(Kharif 2007)</b>	<b>Sowing area (ha.)( Rabi 2006 )</b>
<b>I)</b>	<b>Cereals</b>		
1	Jowar	1620	11487
2	Maize	-	367
3	Paddy	4530	-
4	Ragi	7	-
5	Wheat	-	3615
6	Other cereals	0	0
<b>II)</b>	<b>Pulses</b>		
7	Gram	-	2183
8	Moong	405	-
9	Tur	126	10
10	Udid	150	-
11	Other Pulses	487	47
<b>III)</b>	<b>Oil seeds</b>		
12	Groundnut	1937	-
13	Kardai	-	105
14	Linum	-	10
15	Sesamum	-	4
16	Soyabean	567	-
17	Sunflower	-	7
18	Niger	37	-
<b>IV)</b>	<b>Cash Crop</b>		
19	Sugarcane	8598	-
	<b>Total</b>	<b>18464 / 53600</b>	<b>17835 / 18900</b>
	<b>Percentage</b>	<b>34.44 %</b>	<b>94.36 %</b>

#### d) Weed Floristic Studies

These studies were made by quadrat method. Five quadrats, each of 1m<sup>2</sup> were marked in all dicot crop fields. For the quantitative estimation of weeds, ecological parameters like Frequency, Frequency class, Density, Abundance were determined. Ecological values were calculated by using formulae (Mishra, 1968). Twenty dominant weeds from study area were identified on the basis of these values.

i) **Frequency Class** –It is determined on the basis of percentage frequency values of individual species. Species were divided into 5 classes (Raunkiaer, 1934). The classes are, Class A: 1 to 20%, Class B: 21 to 40%, Class C: 41 to 60 %, Class D: 61 to 80 % and Class E: 81 to 100%.

ii) **Frequency (%)**: It determined on the basis of percentage frequency values of individual species.

$$\text{Frequency (F)} = \frac{\text{Number of quadrats in which a species occurred}}{\text{Total number of quadrats sampled}} \times 100$$

iii) **Abundance (A)**: It is the ratio of total number of individuals to number of quadrats in which species was recorded.

$$\text{Abundance (A)} = \frac{\text{Total number of individuals of a species in all quadrat}}{\text{Total number of quadrats in which the species occurred}}$$

iv) **Density (D)**: It is the ratio of total number of individuals of each species divided by the total number of quadrats studied. It determines numerical strength of species.

$$\text{Density (D)} = \frac{\text{Total number of individuals of a species in all quadrat}}{\text{Total number of quadrats sampled}}$$

#### e) Morphotaxonomical Studies

Fresh weed plant species were collected from dicot fields, dried, poisoned and mounted on herbarium sheets (Subramanyam, 1997). All the species were classified according to Bentham and Hooker's system of classification (Lawrence, 1958). The life forms were identified using Flora of presidency of Bombay-Vol I to III (Cook, 1967) and Flora of Kolhapur district (Yadav and Sardesai, 2002). Nomenclatural changes were made by using Flora of Maharashtra State, Monocotyledones (Sharma *et al.*, 1996), Flora of Maharashtra State, Dicotyledones (Singh *et al.* Vol. I, 2000 and Singh *et al.* Vol. II, 2001).

Exotic and endemic status of life forms was assessed by using flora of Mahabaleshwar and adjoining, Maharashtra Vol. I (Deshpande *et al.*, 1993 ), Flora of Maharashtra State, Dicotyledones Vol. II (Singh *et al.* 2001) and Flora of Marathwada, Vol. I (Naik, 1998). The herbarium specimens prepared during the study have been deposited in the Department of Botany, Yashwantrao Chavan Institute of Science, Satara.

The botanical characters of twenty dominant weed species based on ecological parameters were studied. These weed species are as follows. *Acalypha indica*, *Ageratum conyzoides*, *Alternanthera sessilis*, *Amaranthus viridis*, *Arthraxon hispidus*, *Brachiaria eruciformis*, *Commelina subfruticosa*, *Cyperus rotundus*, *Dinebra retroflexa*, *Eclipta prostrata*, *Euphorbia geniculata*, *Euphorbia hirta*, *Euphorbia rosea*, *Launaea procumbens*, *Mollugo pentaphylla*, *Parthenium hysterophorus*, *Phyllanthus niruri*, *Physalis minima*, *Portulaca oleracea*, *Tridax procumbens*.

Parameters selected for these studies were 1) Average length of root, (2) Average length of internode (stem) (3) Average angle made by third leaf with the stem (4) Stem transverse section (5) Longitudinal section (stem) (6) Thickening of vessels (7) Stomatal type (8) Stomatal index (9) Kranz anatomy. For the purpose of convenience, these parameters were classified as macro and microcharacters. First three parameters were included in macrocharacters and other characters were included in microcharacters.

For this purpose twenty dominant weeds were collected fresh and studied in the laboratory. For the study of morphological parameters 10 observations were recorded for each parameter. Internal characters were studied by using thin hand sections. For stomatal studies peel technique was used (Hilu and Randall, 1984) and stomatal index was determined by formula  $SI (\%) = S/S+EX \times 100$  where E=No. of Epidermal Cells, S= No. of Stomata (Dhopte and Livera, 1989).  $C_3$ ,  $C_4$  status of weed species was determined by Kranz anatomical method (Kadam *et al.*, 2004). Standard deviations were determined for each parameter by using formula.  $\sigma_{Et} = (\sigma_{Et}^2)^{1/2}$  where  $\sigma_{Et}$  is mean. (Dhopte and Livera, 1989). Microphotographs of the slides were taken by digital camera (Model Sony Cybershot-W-38 (7.2 MP) under low power (10x) and high power (45x).

**f) General Climatic Features –**

Climatic records of study area during 2006-2007 have been obtained from Meteorological Department of India, Satara. Monthwise maximum and minimum values of temperature, total rainfall, number of rainy days, lowest and highest values of humidity were recorded. They are given in Table 2.

The climate of study area is characterized by three seasons namely, monsoon, cold and hot. June to September are the months of south west monsoon season. October and November constitutes the post monsoon or the retreating post monsoon season. The cold season starts or commences from November and continues up to middle of February. It is followed by hot season from middle of February till May or first week of June depending upon arrival of the monsoon.

**Table 2: Monthly Meteorological Records Of Study Area (Year 2006-2007).**

Month	Year	Temperature °C		Rainfall (mm.)		Humidity	
		Max.	Min.	Mm.	Days in month	Max.	Min.
June	2006	29.9	22.1	303.2	21	98	49
July	2006	25.6	21.9	464.0	31	97	75
August	2006	25.2	21.3	334.1	31	98	71
September	2006	29.8	21.3	110.8	24	98	63
October	2006	31.3	19.9	43.0	10	95	37
November	2006	30.7	18.4	42.1	13	95	46
December	2006	30.6	13.3	–	–	90	42
January	2007	31.5	13.6	0.3	01	89	31
February	2007	32.3	14.5	–	–	86	25
March	2007	36.2	18.4	–	–	83	29
April	2007	38.2	22.1	32.7	04	81	22
May	2007	36.7	23.2	5.6	03	73	29
June	2007	30.2	22.9	368.2	18	98	50
July	2007	27.4	22.1	329.3	31	98	55
August	2007	26.9	21.7	214.6	27	98	67
September	2007	31.5	13.6	0.300	22	97	59
October	2007	32.9	19.6	0.800	02	89	29
November	2007	32.0	15.5	1.900	02	91	28
December	2007	31.2	14.4	–	–	86	28

July being the rainiest month in the year 2006 while June shows maximum rainfall in 2007. Average number of rainy days estimated to be 122 in 2006 while in 2007 number of rainy days was 106. Annual rainfall was 1571.1 mm in the year 2006 whereas 1274.7 mm in the year 2007. However variations in the rainfall from year to year is considerable and study area shows irregular distribution of monsoon. The cold weather starts by about the middle of November and continues till the end of February. January is the coldest month. From March to break of South West monsoon, the day temperature increases progressively while the nights remain comparatively cool. April is hottest month of the year. Maximum temperature recorded in 2006 was 37.9<sup>0</sup>C and 38.2<sup>0</sup>C in 2007, whereas minimum temperature was 12.5<sup>0</sup> C (January 2006) and 13.6<sup>0</sup>C (January 2007) respectively.

Maximum and Minimum humidity values recorded in the year 2006 were 98% and 42%, while in the year 2007, 98% and 22% respectively.

**Figure 2: Graph Showing Monthly Meteorological Variations In Study Area (Year 2006-07).**

