

# **Distribution of major weeds and their association with soil fertility parameters in rubber plantations of South India**

*Presented by*

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# Introduction

- **Geographical distribution of species is influenced by climate and other biophysical environments**
- **At the micro level, resource availability in the immediate environment is the major determinant of species dominance**
- **The presence or absence of certain weeds or plants in a field can be correlated with soil reaction, organic matter content and other nutritional factors (*Vidya, 2003, Blackshaw and Brandt, 2008, Li et al., 2017 Metcalfe, et al., 2019*).**

- During 1995-97, the most widespread weed species was *Cyathula prostrata*, a soft dicot short statured plant without aggressive growth habit (*Abraham and Abraham, 2000*).
- In subsequent observations, large scale infestation of monocot weeds was observed.
- Changes in weed dynamics can have major implications for nutrient cycling in rubber plantations.
- Mapping distribution of species at local/regional levels will help to monitor and assess changes in their distribution and relate with changes in ecology of the region.

## **Objective**

**Document the distribution of major weeds in rubber plantations of South India and their association with soil nutrient status.**

## **Methodology**

**The data was collected through a survey conducted in estates and small holdings in the traditional rubber growing regions of Kerala, Tamil Nadu, Karnataka, Goa and Maharashtra in 10760 holdings**

**Period of survey - December 2012 to April 2013**

***Axonopus compressus, Chromolaena odorata, Cyathula prostrata, Clerodendron infortunatum, Mimosa pudica* were the most widespread weeds in rubber plantationsv (KAU 2008)**

- **Major weeds (weed or weeds which cover more than 50 per cent area) in each holding was documented by officers trained in the identification of weeds.**
- **The distribution of weeds was mapped in GIS.**
- **The soil fertility status of all the holdings was determined by standard analytical protocols.**
- **The distribution of weeds in different fertility classes were also assessed.**
- **Chi square test was conducted to find out whether there is association between the distribution of weeds and soil fertility status.**

# Results

## Distribution of weeds in rubber plantations of South India.

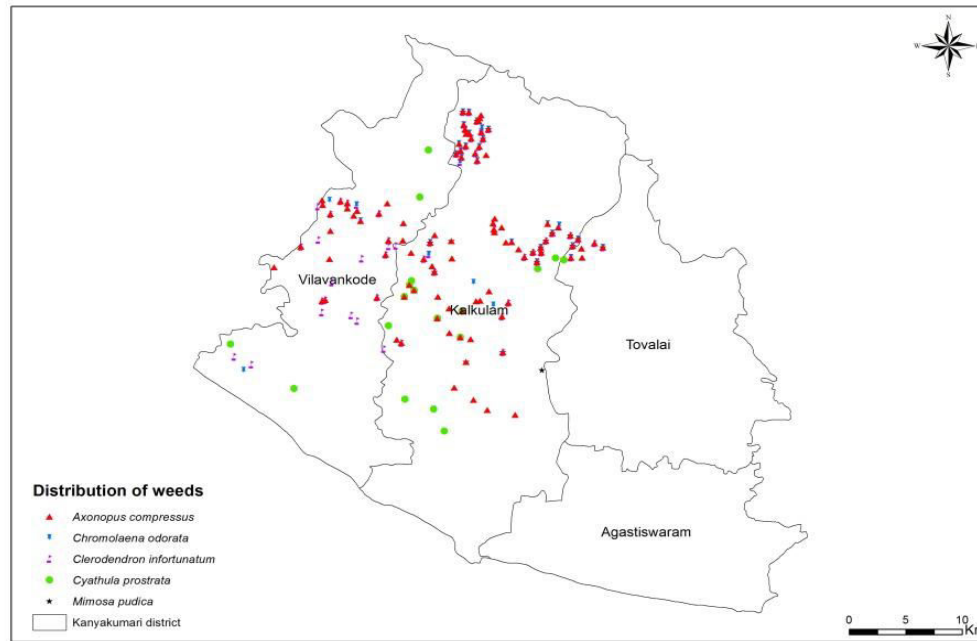
State/District	% of holdings with dominance of					
	<i>Axonopus</i>	<i>Chromolaena</i>	<i>Clerodendron</i>	<i>Cyathula</i>	<i>Mimosa</i>	Others
<b>Tamil Nadu</b>						
<b>Kanyakumari(n-251)</b>	<b>40.64</b>	<b>16.73</b>	<b>26.69</b>	<b>7.17</b>	<b>8.37</b>	<b>0.4</b>
<b>Kerala</b>						
<b>Trivandrum(n-251)</b>	<b>72.11</b>	<b>1.99</b>	<b>23.90</b>	<b>1.20</b>	<b>0.00</b>	<b>0.8</b>
<b>Kollam (n-314)</b>	<b>71.97</b>	<b>4.46</b>	<b>13.69</b>	<b>6.69</b>	<b>0.00</b>	<b>3.19</b>
<b>Pathanamthitta (n-666)</b>	<b>41.59</b>	<b>5.86</b>	<b>32.58</b>	<b>9.31</b>	<b>6.31</b>	<b>4.35</b>
<b>Alappuzha (n-40)</b>	<b>75.00</b>	<b>0.00</b>	<b>22.50</b>	<b>2.50</b>	<b>0.00</b>	<b>0</b>
<b>Ernakulam (n-1306)</b>	<b>38.97</b>	<b>12.25</b>	<b>22.89</b>	<b>15.70</b>	<b>6.05</b>	<b>4.14</b>
<b>Idukki (n-1024)</b>	<b>54.00</b>	<b>4.88</b>	<b>13.18</b>	<b>18.95</b>	<b>1.95</b>	<b>7.04</b>
<b>Kottayam (n-2401)</b>	<b>33.69</b>	<b>7.16</b>	<b>16.95</b>	<b>28.32</b>	<b>4.16</b>	<b>9.72</b>
<b>Palakkad (n-410)</b>	<b>47.07</b>	<b>19.27</b>	<b>15.12</b>	<b>2.93</b>	<b>6.59</b>	<b>9.02</b>
<b>Trissur (n-347)</b>	<b>27.95</b>	<b>23.92</b>	<b>29.39</b>	<b>9.22</b>	<b>4.61</b>	<b>4.91</b>
<b>Kannur (n-1296)</b>	<b>28.78</b>	<b>30.17</b>	<b>14.97</b>	<b>10.03</b>	<b>11.42</b>	<b>4.63</b>
<b>Kasargod (n-101)</b>	<b>16.83</b>	<b>76.24</b>	<b>4.95</b>	<b>1.98</b>	<b>0.00</b>	<b>0</b>
<b>Kozhikode (n-176)</b>	<b>9.66</b>	<b>43.75</b>	<b>24.43</b>	<b>10.23</b>	<b>9.09</b>	<b>2.84</b>
<b>Malappuram (n-505)</b>	<b>34.06</b>	<b>33.86</b>	<b>19.21</b>	<b>5.54</b>	<b>4.36</b>	<b>2.97</b>
<b>Wayanad (n-165)</b>	<b>89.09</b>	<b>0.61</b>	<b>5.45</b>	<b>0.00</b>	<b>4.24</b>	<b>0.61</b>

## Distribution of weeds in rubber plantations of South India (*contd*).

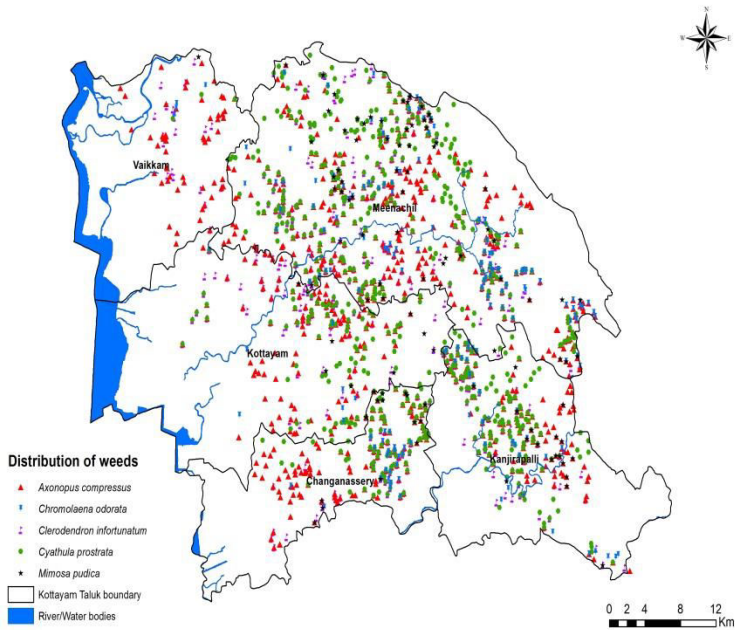
State/District	% of holdings with dominance of					
	<i>Axonopus</i>	<i>Chromolaena</i>	<i>Clerodendron</i>	<i>Cyathula</i>	<i>Mimosa</i>	Other s
<b>Karnataka</b>						
<b>Coorg (n-26)</b>	46.15	26.92	11.54	0.00	11.54	3.85
<b>Dakshin Kannada (n-284)</b>	27.82	40.14	19.37	0.70	10.56	1.41
<b>Udupi (n-34)</b>	35.29	23.53	20.59	0.00	17.65	2.94
<b>Goa</b>						
<b>North Goa (n-8)</b>	87.50	0.00	12.50	0.00	0.00	0
<b>South Goa (n-8)</b>	50.00	0.00	37.50	0.00	0.00	12.5
<b>Maharashtra</b>						
<b>Sindhudurg (n-49)</b>	22.45	44.90	6.12	10.20	14.29	2.04



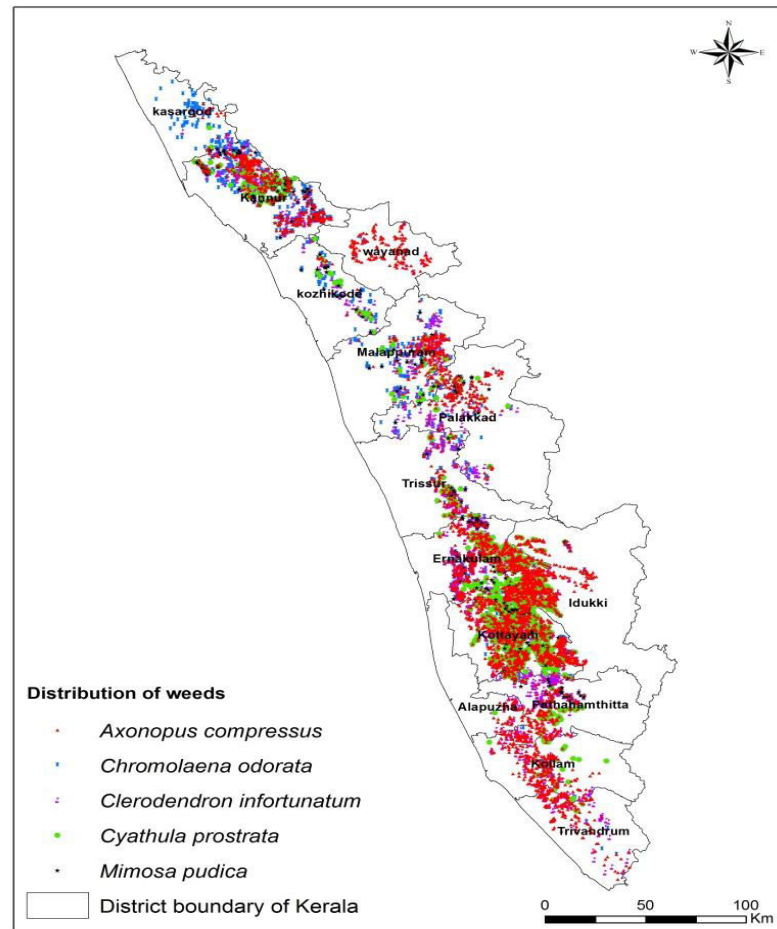
# Distribution of weeds in rubber plantations of Kanyakumari Dt



# Distribution of weeds in rubber plantations of Kerala

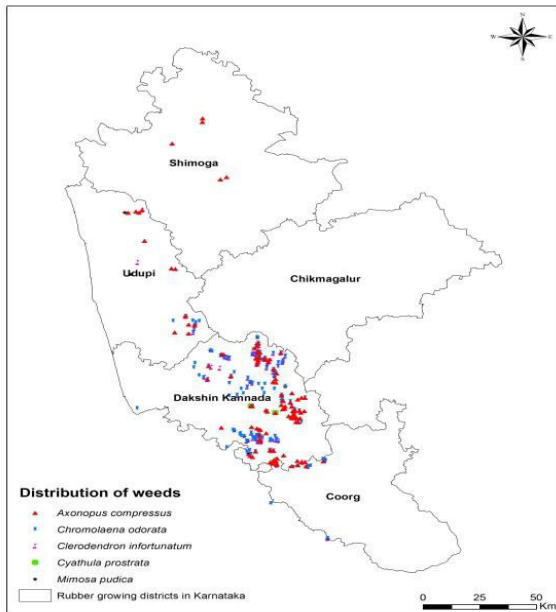


Kottayam district

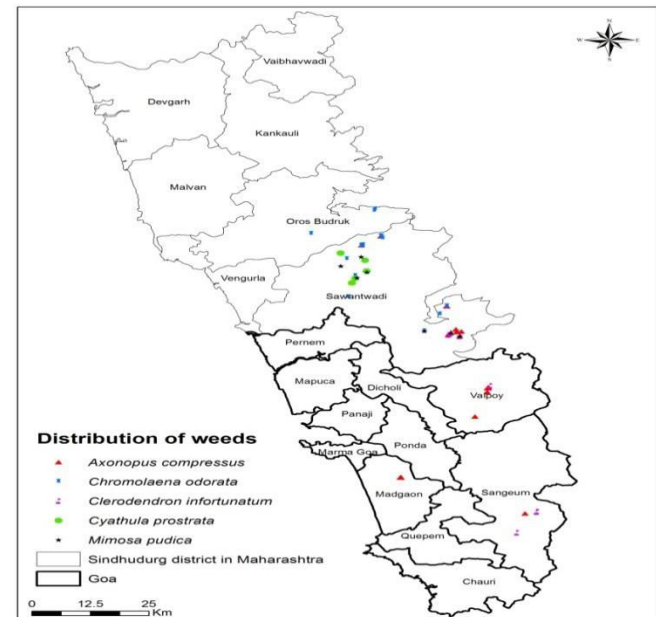


Kerala State

## Distribution of weeds in rubber plantations of Karnataka



## Distribution of weeds in rubber plantations of Goa and Maharashtra



## Distribution of weeds under various soil pH and organic carbon categories

Weed	% of holdings						
	Soil pH				Organic Carbon		
	Extre Acidic	Very strongly acidic	Strongly acidic	Moderat ely acidic	Low	Medi um	High
<i>Axonopus</i>	46.2	40.0	40.3	56.3	47.00	46.6	43.8
<i>Chromolaena</i>	13.0	16.2	17.7	15.6	14.9	11.5	13.8
<i>Clerodendron</i>	20.7	20.5	18.8	15.6	19.3	22.2	19.1
<i>Cyathula</i>	16.4	17.3	15.1	3.1	14.4	15.7	17.5
<i>Mimosa</i>	3.7	6.3	8.0	9.4	4.4	3.9	5.7
n	2779	4228	946	32	181	1654	4027
Chi.Square value	123.44				127.44		

## Distribution of weeds under various soil available P and available K categories

Weed	% of holdings					
	Available P			Available K		
	Low	Medi um	High	Low	Mediu m	High
Axonopus	40.50	43.00	47.90	45.20	38.50	40.90
Chromolaena	17.60	11.80	11.40	17.00	13.20	14.6
Clerodendron	18.90	23.30	21.30	20.20	20.40	20.60
Cyathula	17.00	16.70	15.40	13.00	21.10	17.90
Mimosa	6.10	5.20	4.10	4.60	6.80	6.00
n	4872	1971	1143	4194	3428	364
Chi.Square value	78.95			127.5		

# Distribution of weeds under various soil available Ca and available Mg categories

	% of holdings					
Weed	Available Ca			Available Mg		
	Low	Medium	High	Low	Medium	High
Axonopus	43.70	41.10	39.50	48.40	43.60	38.90
Chromolaena	11.40	16.20	22.70	8.60	10.60	22.30
Clerodendron	20.80	19.80	19.60	21.20	20.70	19.60
Cyathula	19.20	17.70	10.80	18.40	20.30	12.00
Mimosa	4.90	5.20	7.30	3.30	4.80	7.10
n	4380	1503	2103	810	3868	3308
Chi.Square value	203.22			307.29		

# Conclusions

***Axonopus* was the most widespread weed in rubber plantations.**

**The percentage of holdings with occurrence of *Axonopus* decreased as the available Ca and Mg status of the soil increased.**

**Percentage of holdings with *Chromolaena* increased**

**from 11.40 in soils with low available Ca status to 22.70 in soils with high available Ca status.**

**from 8.60 in soils with low available Mg status to 22.30 in soils with high available Mg status.**

**The survey gives an overall picture of the distribution of major weeds in rubber plantations of South India.**

**Re-surveys of distribution on a later period test whether changes are consistent with ecological changes.**

***The data on distribution of weeds was collected by visual scoring and lack of quantitative data is a limitation of the study.***

**Thank you**