ISSN (Online) : 2455 - 3662
SJIF Impact Factor :3.395 (Morocco)

EPRA International Journal of

Multidisciplinary Research

Volume: 2 Issue: 5 May 2016

Published By :
EPRA Journals

EPRA International Journal of Multidisciplinary Research (IJMR) ISSN (Online): 2455-3662

SJIF Impact Factor: 3.395 (Morocco) Volume: 2 Issue: 5 May 2016

CROPPING PATTERN IN THE PENNAR RIVER BASIN

Dr.G.Rambabu[1]

[1]Department of Geography, S.K.University, Ananathapuramu,A.P, India

Prof.A.Krishna Kumari[2]

[2]Department of Geography, S.K.University, Ananathapuramu,A.P, India

ABSTRACT

India being an agrarian country, understanding the agricultural scenario is very much essential for further planning, particularly, for arid and semi-arid areas. River Pennar being a non -perennial river flowing through Anantapuram,Kadapah, Chittor, Kurnool, Prakasam, Nellore and some talukas of Karnataka stateinfluencing the agricultural pattern in a marked way. Hence, an attempt is made here to understand the cropping pattern, its diversification and combinations in Pennar river basin consisting of 198 mandals for the year 2010-11.

KEYWORDS: *River, cropping pattern, agricultural scenario, crop diversification*

INTRODUCTION

In recent years a great deal of attention has been paid by agricultural geographers and also by agricultural economists and rural sociologists to improve the methods of delimiting agricultural regions. Agriculture is not only an economic activity and also a form of applied ecology because the patterns of agricultural distribution and production are related to divergent agricultural ecological conditions which primarily influence the regional diversity and uniformity in farming. On this account, there is an almost bewildering diversity in agricultural patterns. Crops in particular, and livestock to a lesser extent, largely depend on the resources of their immediate natural endowments which can be modified only at a heavy cost.Hence, an attempt is made here to understand the cropping pattern, its diversification and combinations in Pennar river basin consisting of 198 mandals for the year 2010-11.

STUDY AREA

The Pennar River basin covers an area about 55,213km^2 and lies in between 10^0 and 16^0 North latitude and 77^0 and 81^0 East longitude. The river originates in northern part of Karnataka state in Nandi hills and passes through the Anantapuram,Kadapah, Chittor, Kurnool, Prakasam, Nellore and some talukas of Karnataka stateand empties into Bay of Bengal, 30km ENE of Nellore after passing through the Pennar delta of Nellore district. The average annual rainfall of the Pennar basin is 732.11mm. The average minimum temperature is about 18^{0}C and the average maximum temperature is about 42^{0}C. The basin enjoys semiarid, dry sub-humid and wet sub-humid types of climate.

OBJECTIVES

The main objectives of the study are

1. to study the cropping pattern or the Pennar river basin
2. to analyze the crop diversification of the Pennar basin and
3. to bring out the crop combination of the Pennar basin.

METHODOLOGY

In the present study, simple percentage of various crops have been taken to study the crop concentration of the Pennar river basin. Crop diversification is worked out using Bhatia method (1965). The crop diversification index according to Bhatia (1965) is the percentage of all sown areas of all crops divided by number of crops multiply 100. It indicates the crop variety and large number of crops grown in a year over the crop land. Movi(1963) considered the ratio between mean of the difference in percent area covered by successive crops arranged rank wise and number of the crops as the measure of diversification. He selected 5% of the crop land instead of 10% of crop land taken by Bhatia. The quantitative technique used by Gibbs & Martin (1962) to measure the diversification laborers' in various industries. The diversification index of Punjab was studied by Jhujar Singh (1979).

The crop diversification index of the Pennar basin varies from minimum of 3% in Atmakur in Kurnool district to maximum of 75% in Alurmandal. The average crop diversification is 23.50% of the Pennar basin. The spatial distribution shows that the majority of the mandals in the southwest, central, northeast, northern, eastern and southeast, the crop diversification is less than 15%. It varies from 15% to 30% in the mandals located in northwestern, western a few central mandals, northeastern and southern mandals of the basin. The crop diversification is more than 30% in twenty eight mandals of the basin. The combination analysis was originally introduced into geographical research by Weaver (1954) in his outstanding study of crop combinations in the Midwestern United States. There are mainly two techniques with which we can establish crop combinations, viz. semi-statistical and statistical. A modified form or Weaver's technique has been put forward by Doi's (1959), which was considered to be the easiest for combination analysis till the computer programming facilities made the task to tedious calculations for deviation analysis easy and simple. The modified format of Doi's technique solves the problems of Weaver's technique simultaneously by substituting the variance $\left(\sum d^2 / n\right)$ or least standard deviation $\left(\sqrt{\frac{d^2}{m}}\right)$ of Weaver with the sum of squared deviations ($\sum d^2$). The combination having the lowest $\sum d^2$ will be the crop combination. In Doi's technique it is not required to calculate $\sum d^2$ for each combination but the crop combination is actually established by consulting one-sheet table which presents critical values for various elements here mean crop, livestock or enterprises. The use of one-sheet table requires only the summing up of actual percentages under different crop instead of finding the differences between actual percentages and theoretical distributions.

Cropping pattern means the proportion of area under various crops at a point of time. Cropping pattern is also determined by the spread of crops expressed as percentage of total cropped area of major crops. It includes the identification of most efficient crops of the region. The total cropped area during 2010-11 amounts to 2,163,804 hectares which accounts 39.19% of the total geographical area. About 308,775 hectares (14.27%) is under paddy crop, about 1,560,100 hectares of land (72.10%) is under groundnut crop, about 158,176 hectors of land (7.31%) is under jowar crop, 18176 hectares of land (0.84%) is under other food crops, 45,009 hectares of land (2.08%)is under fruits and vegetable, 28,563 hectors of land (1.32%) is under bengal gram crop, 24,452 hectares of land (1.13%) is under sunflower crop, 10,819 hectors of land (0.5%) is under flowers cultivation, and 9,738 hectors of land (0.45%) is under the other non-food crops.

The spatial distribution of paddy crop 2010-11 shows high concentration in Kunderu valley in northern, eastern and western mandals of the basin. The paddy concentration is medium in southern mandals of the Pennar basin and low in central mandals of the basin. The paddy crop needs high amounts of water. The duration of the crop is 100 to 120 days and water requirement is 1000mm. to 1500mm during the crop period under normal climatic conditions. The total paddy cropped area is 308,775 hectors. The paddy crop in the basin is cultivated under canal, tank and tube well irrigation. The jowar crop concentration is high in northern, northwestern and a few central mandals of the basin. The jowar concentration is medium in a few mandals and low in the western, central, and eastern mandals of the basin. The jowar crop is cultivated both under rain fed and irrigated sources. The total cropped area of the jowar crop is 18,176 hectors of land. The duration of jowar crop is 100 to 105 days and the water requirement is about 450mm to 500mm. The bengal gram cropped area is about 28,563 hectors of land. The duration of bengal gram crop is 70 to 80 days and the water requirement is 200mm to 250mm. The bajra crop concentration is high in northwestern, southwestern, and northeastern mandals of the basin. Its concentration is low in western, northern, southern, central and eastern mandals of the basin.

The bajra crop duration is 90 days and it requires 300mm. to 350mm. of water during crop period. The bajra crop is cultivated under rainfed condition in the basin. The ragi crop concentration is low in western and central mandals of the basin. The ragi crop duration is 100 to 105 days and it requires 450mm to 500mm. The ragi crop is cultivated in the basin under rain-fed conditions. The ground nut crop concentration during 2010-11 is high in central, western, southern, northern and a few northeastern mandals of the basin. The crop is cultivated in about 1,560,100 hectares of land and accounts for 72.10% of the total cropped area of the basin. The crop concentration is low in the northeastern and eastern mandals of the basin. The groundnut crop duration is about 100 to 105 days and it requires 600mm to 650mm. of water during the crop period. The groundnut crop in the basin is cultivated in majority of the mandals under rainfed conditions. The cotton crop concentration is high in northern and eastern mandals of the basin is high. The cotton is cultivated in black soil plains of the basin. In central mandals the cotton crop concentration is low. The cotton crop duration is 165 days and it requires 650mm to 700mm. of water. The crop is cultivated in the black soil plains of the basin. The sugarcane crop concentration is low in western, northwestern, and a few mandals in southern and eastern mandals of the basin. The sugarcane crop duration is 365 days and it requires 2250mm to 2500mm of water. The sugarcane crop in the basin is cultivated under tube well irrigation. The concentration of fruits and vegetables is high in Kunderu valley and in a few mandals in eastern parts of the basin. The fruits & vegetable cropped area is about 45,009 hectares. The duration of vegetables like tomato, chillies, brinjal, and lady finger varies from 95 to 160 days. The water requirement for tomato, lady finger and brinjal varies from 550mm to 600mm during crop period and for chillies the water requirement varies from 750mm to 800mm. The vegetables are cultivated under tank or tube well irrigation in major parts of the basin. The major fruits cultivated in the basin are banana, papaya, pomegranate, oranges, water melon and grapes. They are cultivated under tank or well irrigation. The sunflower cropped area is about 24,452 hectares. The duration of sunflower crop is 90 to 105 days and it requires 550mm to 600mm of water.

The crop combination of the Pennar River basin has been worked out using the Doi's method (1955). The major crop cultivated in the Rayalaseema region paddy, jowar, bengal gram, other food crops, ground nut, sunflower, flowers, other non food crops, Fruits & vegetables and sugar cane. The percentage of each crop cropped area is worked out to the total cropped area of the mandal they are arranged in hierarchy according to their ranks. Following Doi's calculated table of crop combination the crop combination of the Pennar basin has been brought out. From the analysis of the crop combination method it is found that in about 64 mandals distributed in western, southern, northern and part of central, mandals mono crop is cultivated. The mono crop is also cultivated in eastern mandals of the deltaic region of the Pennar basin. The mono crop in these mandals is paddy. In the Kunderu valley in about 6 mandals mono crop is cultivated the crop is paddy. The two crop combination is found about 41 mandals of the Pennar basin. They are distributed in the south western, southeastern, eastern parts of the central mandals of the basin. The two crop combinations are Ground nut, sunflower; Ground nut and Fruits & vegetables; Ground nut and Bengal gram; Ground nut and Sunflower; Paddy, Fruits& vegetables; and Paddy and Jowar. The three crop combination is found in about 46 mandals. They are distributed in the Badvel valley, Kunderu valley and in a few mandals in southeastern and eastern parts of the basin. The three crop combinations are Ground nut, Paddy, Fruits& vegetables; Ground nut, Bengal gram and Sunflower; Ground nut, Paddy and Bengal gram; Bengal gram, Fruits & vegetables and Ground nut; Fruits& vegetables, Paddy and other food crops; other nonfood crops, Paddy and other food crops; and Paddy, Fruits& vegetables and other non food crops. They are distributed in Kunderu valley. The four crop combination is found in about 11 mandals of the Pennar basin. The four crop combinations are Ground nut, Bengal gram, Sunflower, Fruits & vegetables; Ground nut, Bengal gram, Sun flower and Jowar; Sunflower, Paddy, other food crops and Bengal gram; Bengal gram, Sunflower, Paddy and Ground nut; Bengal gram, Jowar, Sunflower and Paddy; Bengal gram, Sunflower, Jowar and Paddy; Sunflower, Ground nut, Bengal gram, Fruits & vegetables; Ground nut Fruits & vegetables, Paddy and Sunflower; and Paddy, other food crops, Fruits & vegetables and Sunflower. They are distributed mostly in Kunderu valley in the basin.

From the analysis of crop combination it is found that mono crop with Ground nut is noticed in majority of the western, southern and parts of the central mandals of the basin. Paddy is predominant mono crop in the deltaic region. Three cop combinations are found in the Kunderu and Badvel valley. Four crop combinations is in noticed in Kunderu valley.

Crop diversification and crop combination of the Pennar river basin

Table.1

S.No	Mandalam	Crop diversification in %	Category	Crop combination	Combination Crops
1	Anantapur	16	Medium	Mono crop	GN
2	Raptadu	28	Medium	Mono crop	GN
3	Garladinne	19	Medium	Three crops	GN,PD,F&V
4	Atmakur	19	Medium	Mono crop	GN
5	Kudair	26	Medium	Mono crop	GN
6	Singanamala	21	Medium	Mono crop	GN
7	B.K.Samudram	22	Medium	Mono crop	GN
8	Narpla	19	Medium	Mono crop	GN
9	Tadipatri	14	Low	Four crops	GN,BG,SF,F&V
10	Yadiki	17	Medium	Two crops	GN,SF
11	Peddapappur	12	Low	Two crops	F&V, GN
12	Putlur	24	Medium	Three crops	GN,BG,SF
13	Yellanur	18	Medium	Two crops	GN,F&V
14	Guntakal	27	Medium	Mono crop	GN
15	Gooty	24	Medium	Mono crop	GN
16	Pamidi	11	Low	Two crops	GN,SF
17	Peddavadugur	19	Medium	Mono crop	GN
18	Uravakonda	37	High	Two crops	GN,BG
19	Vajrakarur	44	High	Two crops	GN,BG
20	Vidapanakal	41	High	Three crops	BG,SF,GN
21	Dharmavaram	31	High	Mono	GN
22	Tadimarri	20	Medium	Mono	GN
23	Bathalapalle	18	Medium	Mono	GN
24	Cennekothapalle	24	Medium	Mono	GN
25	Kanaganaplle	29	Medium	Mono	GN
26	Ramagiri	23	Medium	Mono	GN
27	Kalyanadurgam	38	High	Mono	GN
28	Beluguppa	37	High	Two	GN,BG
29	Kambadur	33	High	Mono	GN
30	Kundurpi	27	Medium	Mono	GN
31	Brahmasamudram	23	Medium	Mono	GN
32	Settur	28	Medium	Mono	GN
33	Rayadurgam	23	Medium	Mono	GN
34	D.Hirehal	18	Medium	Mono	GN

35	Gummagatta	18	Medium	Mono	GN
36	Kanekal	37	High	Two	BG,GN
37	Bommanahal	16	Medium	Three	GN,PD,BG
38	Penukonda	16	Medium	Mono	GN
39	Somandepalle	12	Low	Mono	GN
40	Roddam	26	Medium	Mono	GN
41	Puttaparthi	13	Low	Mono	GN
42	Kothacheruvu	13	Low	Mono	GN
43	Bukkapatnam	14	Low	Mono	GN
44	Madakasira	27	Medium	Mono	GN
45	Amarapuram	19	Medium	Mono	GN
46	Gudibanda	18	Medium	Mono	GN
47	Rolla	13	Low	Mono	GN
48	Agali	12	Low	Mono	GN
49	Hindupur	7	Low	Two	GN, OFC
50	Parigi	8	Low	Two	GN, OFC
51	Lepakshi	9	Low	Two	GN, OFC
52	Chilamathur	16	Medium	Mono	GN
53	Gorantla	26	Medium	Mono	GN
54	Kadiri	32	High	Mono	GN
55	Mudigubba	32	High	Mono	GN
56	Nallamada	16	Medium	Mono	GN
57	Nambulapulakunta	19	Medium	Mono	GN
58	Talupula	14	Low	Mono	GN
59	Nallachervu	12	Low	Mono	GN
60	O.D.Cheruvu	16	Medium	Mono	GN
61	Tanakal	17	Medium	Mono	GN
62	Amadagur	14	Low	Mono	GN
63	Gandlapenta	9	Low	Mono	GN
64	Tirupathi	5	Low	Three	GN,PD,F&V
65	Pulicherla	20	Medium	Two	F&V, GN
66	Madanapalli	30	Medium	Two	GN,F&V
67	Nimmanapalle	23	Medium	Three	GN,F&V,PD
68	B.Kothakota	24	Medium	Mono	GN
69	Kurabalakota	27	Medium	Mono	GN
70	Thamballapalle	38	High	Mono	GN
71	Peddamandyam	27	Medium	Mono	GN
72	Mulakalacheruvu	40	High	Mono	GN
73	P.T.Samudram	38	High	Mono	GN
74	Vayalpadu	23	Medium	Mono	GN

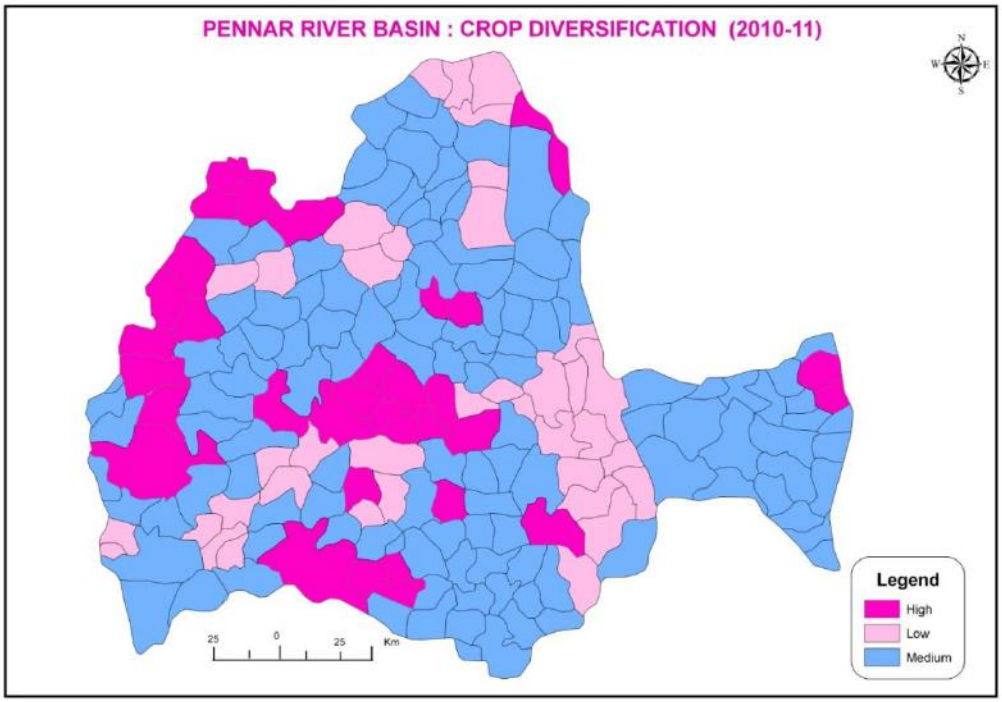
75	Gurramkonda	20	Medium	Two	GN,F&V
76	Kalikiri	15	Medium	Two	GN,F&V
77	Kalakada	21	Medium	Two	GN,F&V
78	Kambavaripalle	28	Medium	Mono	GN
79	Pileru	29	Medium	Two	GN,F&V
80	Rompicherla	17	Medium	Two	GN,F&V
81	Yerravaripalem	22	Medium	Two	GN,F&V
82	Chowdepalle	23	Medium	Two	GN,F&V
83	Somala	25	Medium	Three	GN,F&V,PD
84	Sodam	25	Medium	Three	F&V,GN,PD
85	Orvakal	25	Medium	Three	BG,F&V,GN
86	Bethamcherla	19	Medium	Four	GN,BG,SF,JW
87	Peapally	31	High	Mono	GN
88	Midthur	23	Medium	Three	BG,SF,O FC
89	J.Bungalow	14	Low	Four	OFC,BG,SF,PD
90	Atmakur	3	Low	Mono	SF
91	Velugode	14	Low	Two	PD,SF
92	Pamulapadu	12	Low	Three	OFC,SF,PD
93	Nandyal	19	Medium	Three	PD,JW,BG,
94	Mahanandi	13	Low	Two	PD,F&V
95	B.Atmakur	28	Medium	Mono	PD
96	Panyam	16	Medium	Three	BG,PD,SF
97	Gadivemula	18	Medium	Four	SF,PD,JW,BG
98	Allagadda	24	Medium	Three	BG,JW,PD
99	Rudravaram	13	Low	Four	PD,JW,SF,BG
100	Sirvel	24	Medium	Two	PD,JW
101	Chagalamarri	15	Medium	Four	BG,SF,PD,JW
102	Gospadu	18	Medium	Four	PD,BG,JW,OFC
103	Koilakuntla	23	Medium	Mono	BG
104	Dornipadu	18	Medium	Three	BG,PD,JW
105	Uyyalawada	25	Medium	Mono	BG
106	Sanjamala	27	Medium	Mono	BG
107	Kolimigundla	7	Low	Four	BG,OFC,PD,GN
108	Banaganapalle	26	Medium	Four	BG,JW,SF,PD
109	Owk	13	Low	Four	BG,SF,JW,PD
110	Pathikonda	37	High	Two	GN,BG
111	Tuggali	36	High	Mono	GN
112	Maddikera	32	High	Two	GB,GN
113	Ardhaveedu	34	High	Three	SF,PD,OFC
114	Giddalur	28	Medium	Three	SF,PD,OFC

115	Racherla	31	High	Two	BG,PD
116	Komarolu	29	Medium	Two	BG,PD
117	Kondapur	30	Medium	Two	GN,SF
118	Mylavaram	24	Medium	Three	BG,JW,GN
119	Peddamudium	58	High	Mono	BG
120	Rajupalem	37	High	Two	BG,PD
121	Duvvur	27	Medium	Three	PD,F&V,GN
122	Mydukur	30	Medium	Three	F&V,PD,OFC
123	B.Mattam	19	Medium	Two	PD,SF
124	S.A.K.N	18	Medium	Three	PD,SF,ONFC
125	Kalasapadu	18	Medium	Three	SF,PD,OFC
126	Porumamilla	24	Medium	Three	PD,OFC,SF
127	B.Kodur	12	Low	Three	PD,OFC,SF
128	Badvel	8	Low	Two	PD,SF
129	Gopavaram	5	Low	Two	SF,PD
130	Khajipeta	28	Medium	Three	PD,SF,ONFC
131	Chapadu	24	Medium	Two	PD,SF
132	Proddutur	21	Medium	Two	BG,PD
133	Jammulamadugu	21	Medium	Two	BG,OFC
134	Muddanur	18	Medium	Three	GN,SF,OFC
135	Simhadripuram	54	High	Four	SF,GN,BG,F&V
136	Lingala	57	High	Three	GN,F&V,SF
137	Pulivendula	41	High	Three	GN,SF,BG
138	Vemula	53	High	Three	SF,GN,BG
139	Thondur	51	High	Two	GN,SF
140	V.N.Palli	66	High	Two	GN,SF
141	Yerraguntla	18	Medium	Two	BG,SF
142	Kamalapuram	26	Medium	Three	SF,GN,BG
143	Vallur	15	Medium	Three	SF,PD,BG
144	Chennur	14	Low	Three	PD,ONFC,SF
145	Atloor	6	Low	Three	SF,PD,F&V
146	Vontimitta	5	Low	Three	PD,F&V,SF
147	Sidhavatam	16	Medium	Three	F&V,PD,SF
148	Kadapa	7	Low	Mono	PD
149	C.K.Dinne	13	Low	Three	SF,GN,F&V
150	Pendlimarri	33	High	Two	SF,GN
151	Vempalli	37	High	Three	SF,GN,BG
152	Chakrayapeta	24	Medium	Mono	GN
153	Galiveedu	37	High	Mono	GN
154	Chinnamandem	24	Medium	Two	GN,F&V

155	Sambepalli	30	Medium	Mono	GN
156	T.Sundupalli	31	High	Three	GN,F&V,PD
157	Rayachoti	27	Medium	Mono	GN
158	L.R.Palli	25	Medium	Two	GN,F&V
159	Ramapuram	25	Medium	Three	SF,F&V,PD
160	Veeraballi	19	Medium	Four	GN,F&V,PD,SF
161	Nandalur	9	Low	Three	PD,SF,F&V
162	Penagalur	8	Low	Mono	F&V
163	Chitvel	13	Low	Three	F&V,PD,SF
164	Rajampet	13	Low	Two	F&V,PD
165	Pullampet	10	Low	Two	F&V,PD
166	Obulavaripalle	13	Low	Two	F&V,PD
167	Kodur	22	Medium	Mono	F&V
168	Bogole	24	Medium	Mono	PD
169	Atmakur	27	Medium	Two	PD,ONFC
170	Anumasamudrampeta	26	Medium	Three	ONFC,PD,OFC
171	Dagadarthi	27	Medium	Mono	PD
172	Allur	75	High	Mono	PD
173	Vidavalur	62	High	Mono	PD
174	Kadavalur	41	High	Mono	PD
175	Buchireddypalem	24	Medium	Mono	PD
176	Sangam	22	Medium	Mono	PD
177	Chejerla	27	Medium	Three	OFC,ONFC,PD
178	Ananthasagaram	18	Medium	Two	PD,SF
179	Kaluvoya	22	Medium	Four	PD,OFC,F&V,SF
180	Rapur	15	Medium	Three	F&V,PD,OFC,
181	Podalakur	21	Medium	Three	F&V,PD,OFC
182	Nellore	23	Medium	Mono	PD
183	Kovur	30	Medium	Mono	PD
184	Indukurpet	23	Medium	Two	PD,F&V
185	ThotapalliGudur	26	Medium	Mono	PD
186	Muthukur	22	Medium	Mono	PD
187	Venkatachalam	23	Medium	Mono	PD
188	Manubolu	18	Medium	Mono	PD
189	Sydapuram	20	Medium	Three	F&V,PD,ONFC
190	Chillakur	19	Medium	Three	PD,ONFC,F&V
191	Kota	27	Medium	Two	PD,F&V
192	Vakadu	19	Medium	Two	PD,ONFC
193	Pavagada	31	High	Mono	GN
194	Madhugiri	24	Medium	Mono	GN

195	Koratagere	23	Medium	Two	GN, OFC
196	GowriBindanur	28	Medium	Two	GN,OFC
197	Chick Ballapur	26	Medium	Two	GN,OFC
198	Bagepalli	31	High	Mono	GN

NOTE: - PD=Paddy F&V=Fruits &Vegetables GN=Groundnut ONFC=other non-food crops SF=Sun flower JW=Jower BG=Bengal gram PL=Pluses OFC=other food crops



CONCLUSIONS

The land use of the Pennar basin has been studied for the year 2010-2011 at mandal level. Out of the total geographical area of 5,521,300 hectares of the land in Pennar basin about 1,059,537 hectares of land is under forest cover. It accounts for 19.19% of the total geographical area of Pennar basin. The concentration of forest cover is high in Nallamalai, Palakonda, Thirumala, Seshachalam, Bukkapatnam, and Penukonda hills. The total land under barren and uncultivable land is about 570,350 hectares in Pennar basin. It accounts for 10.33% of the total geographical area of Pennar basin. The total land under put to non agricultural use is about 934,756 hectares of land and accounts for 16.93% of the total geographical area of the Pennar basin. The land under permanent pastures amounts to 123,677 hectares of land and accounts for 2.24% of the total geographical area of the Pennar basin. The total land under miscellaneous trees and groves is about 65,151 hectares of land and accounts for 1.18% of the total geographical area of the Pennar basin. The total land under at cultivable waste land is about 65,151 hectares of land and accounts for 1.18% of the total geographical area of the basin. The total land under other fallows is about 296,478 hectares of land and accounts for 5.37% of the total geographical area of the basin. The current fallow land is about 247,906 hectares of land during 2010-11 and accounts for 4.49% of the total geographical area of the basin. The land under net area sown is about 2,163,797 hectares of land and accounts for 39.19% of the total geographical area of the basin. Irrigation plays a vital role for agricultural development in a region. In Pennar basin about 501,334 hectares of land is irrigated for cultivation of crops under different sources. It accounts for 9.08% of the total geographical of the basin. The total cropped area

during 2010-11 amounts to 2,163,804 hectares which accounts 39.19% of the total geographical area. About 308,775 hectares (14.27%) is under paddy crop, about 1,560,100 hectares of land (72.10%) is under groundnut crop., about 158,176 hectors of land (7.31%) is under jowar crop, 18176 hectares of land (0.84%) is under other food crops, 45,009 hectares of land (2.08%)is under fruits and vegetables, 28,563 hectors of land (1.32%) is under bengal gram crop, 24,452 hectares of land (1.13%) is under sunflower crop, 10,819 hectors of land (0.5%) is under flowers cultivation and 9,738 hectors of land (0.45%) is under the other non-food crops.Intensity of cropping pattern is worked out at mandal level taking total cropped area of X mandal by the total net sown area of X mandal multiplied by 100. The intensity of cropping pattern varies from 16% in Atmakurmandal of Kurnool district to a maximum of 209% in Indukurpet of Nellore district of the basin. The average intensity of cropping pattern of the Pennar basin is 113%. The spatial distribution shows that the intensity of cropping pattern is less than 100% in 19 mandals. The crop diversification index of the Pennar basin varies from minimum of 3% in Atmakur in Kurnool district to maximum of 75% in Allurmandal.The average crop diversification is 23.50% of the Pennar basin. The spatial distribution shows that the majority of the mandals in the southwest, central, northeast, northern, eastern and southeast, the crop diversification is less than 15%. It varies from 15% to 30% in the mandals located in northwestern, western a few central mandals, northeastern and southern mandals of the basin. The crop diversification is more than 30% in twenty eight mandals of the basin. From the analysis of crop combination it is found that mono crop with Ground nut is noticed in majority of the western, southern and parts of the central mandals of the basin. Paddy is predominant mono crop in the deltaic region. Three cop combinations are found in the Kunderu and Badvel valley. Four crop combinations are in noticed in Kunderu valley.

REFERENCES

1. *Bhatia, S.S., (1965): Crop concentration and Diversifications economic Geography, 4 (1), pp.35-86.*
2. *Gibbs, W.J. and Mather, J.V. (1967): Rain fall deciles as drought indicators. Bureau of Meteorology bulletin 48, Melbourne, pp.33.*
3. *MaviHarpal Singh, (1963): Crop Diversification in Malwa tract of Punjab. Indian Geographical Journal, Madras, Vol.38. Pp. 75-78.*
4. *Ravi Raj Kumar.T.(1996): Analysis of land use, irrigation, cropping pattern of Andhra Pradesh. India. Unpublished Ph.D. thesis submitted to S.K.University, Anantapur.pp.238.*