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Research Article

TECHNOLOGY ADOPTION IN DRYLAND CROPS OF ANDHRA PRADESH

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Abstract: The study examined the level of technology adoption in dryland crops of Andhra Pradesh namely groundnut, bengal gram, cotton, redgram, jowar, castor and tobacco. An adoption index was constructed to quantify the adoption of selected technologies. The results revealed that across crops drought tolerant high yielding variety was adopted between 71.0 percent and 84.31 percent; with the exception of castor and tobacco, sowing with machinery was adopted between 61.76 percent and 84.38 percent indicating higher rate of adoption. With the exception of curing for tobacco, the technologies like gypsum application and earthing-up in groundnut, nipping, thinning and gap filling in cotton and topping and de-suckering in tobacco were adopted between 14.5 percent and 37.14 percent. The percentage of farmers adopting dryland technologies was high in Prakasam district followed by Kurnool and Ananthapur districts. The overall dryland technology adoption ranged between 35.95 and 46.04 percent among the crops and across the districts.

Keywords: Dryland, Technology, Adoption Index, Major crops, Andhra Pradesh

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Introduction

India is a global agricultural power house. It is the second largest producer of rice, wheat, cotton, sugarcane, tea, fish, sheep and goat meat and fruit and vegetables [1]. In India 69 percent (228 M ha) of the total net sown area (328 M ha) comes under dryland cultivation [2], 35 percent of which receives rainfall between 750 mm and 1125 mm and is drought prone while 33 percent receiving less than 750 mm is chronically drought prone [3]. Nearly 50 percent of the net sown area in India will remain rainfed even after realizing the full irrigation potential [4]. Inspite of all these in India, dryland feeds nearly half of country's population and the contribution of dryland agriculture to total food grain production is about 40 percent and supports two-thirds of livestock population. The predominant crops in drylands include; coarse cereals (85 percent), pulses (85 percent), oil seeds (70 percent) and cotton (65 percent) cultivated by small and marginal farmers. To maintain food security even at the current nutritional levels, 102 MT of food grains have to be produced additionally by 2020. Even in the most optimistic scenario of further irrigation development in India, nearly 40 percent of national demand for food in 2020 will have to be met through increasing the productivity of rainfed/dryland agriculture [5]. Country's first green revolution had greater benefits on irrigated lands where wheat and rice were grown, while the drylands growing coarse cereals were un-attended. Yields of the latter remained very low (< 1.0 t/ha) requiring immediate attention. To achieve the goals of equity, sustainability and environmental stability which the country is aiming, improving rainfed/dryland agriculture is critical. In India, nine states (Rajasthan, Madhya Pradesh, Maharashtra, Gujarat, Chhattisgarh, Jharkhand, Andhra Pradesh, Karnataka and Tamil Nadu) account for over 80 percent of the drylands. In Andhra Pradesh 50.82 percent (40.28 L ha) of the total cultivated area (79.26 L ha) was under dryland during the TE 2014-15. Of this, Ananthapur, Kurnool and Prakasam districts together constituted half (50.60 percent) of the state's dryland area (20.38 L ha) out of the gross cropped area of 26.89 L ha in these three districts.

Technology Adoption in India

The Central Research Institute for Dryland Agriculture (CRIDA) established in 1985 has played pioneering role in developing and dissemination of improved rainfed farming technologies in different agro-ecological regions of India. Over the last 26 years, CRIDA and its network of research stations have developed and disseminated large number of technologies in rainwater management, watershed management, efficient cropping systems, farm machinery and diversified land use systems. Despite good progress made, so far the adoption and diffusion of key rainfed technologies is still low at national level, resulting in large yield gaps between research stations and farmers fields. Increasing climatic variability and climate change pose new challenges in the form of deficit rainfall, droughts and floods [6]. Progress in agriculture primarily depends on timely and proper utilization of technology options by the farmers. In India, about three-fourth of the available technologies were not used by the farmers while extent of use in the developed countries was more than 80 percent. Obviously in India, the yield levels happen to be significantly lower as compared to developed countries. Lower level of use of recommended practices seemed to be the major cause of large differences between the potential and the actual yield.

Technology Adoption in Andhra Pradesh

Andhra Pradesh has been historically categorized as severe and frequently drought affected area, particularly the Rayalaseema region. The constraints faced with erratic rainfall, land degradation, low water holding capacity and poor soil health, high temperature and high evapo-transpiration has resulted in high vulnerability of livelihoods owing to low crop productivity. Agricultural production can be increased by either expanding crop area or increasing crop productivity or both. Unlike intensification option, which has already reached threshold point, productivity increase by technology use is seemingly possible due to the availability of different crop production technologies.

However, the current level of technology adoption is comparatively low which might be due to the fact that technology use increases the cost or not suitable to the situation or the risk involved [7]. This implies the need to study the technology adoption levels. There are specific technologies which are proved to be economically viable and operationally feasible for dry farming but the diffusion of these technologies is very slow. This needs critical examination. Hence, a study has been undertaken to assess the level of technology adoption in dryland crops of Andhra Pradesh. The primary objective of the study was to assess the levels of technology adoption in respect of dryland crops in Andhra Pradesh.

Methodology

The present study focused on Ananthapur, Kurnool and Prakasam districts of Andhra Pradesh, which have been selected purposively because of the prevalence of highest dryland area. In Andhra Pradesh out of the total dryland area of 40.28 L ha, Ananthapur district ranks first with total dryland area (8.9 L ha) followed by Kurnool district (7.25 L ha) and Prakasam district (4.23 L ha) (TE 2014-15) which account for 20.38 L ha. A multistage sampling technique was followed in selecting the three mandals from each of the three districts and further from each mandal to select one village. From each village, 20 farmers were selected randomly and the total sample size was fixed at 180. In order to fulfill the objective of the study, necessary primary data were collected from the sample respondents by the personal interview method, using a pre-tested and structured schedule. The data collected pertains to the agricultural year 2013-14.

Technology Adoption Index

An adoption index was constructed to quantify the adoption of such technologies as given below.

$$\text{Adoption index} = [a/p] \times 100$$

Where,

a = number of practices adopted by respondents

p = total number of practices selected

The respondents were classified as low adopters, medium adopters, high adopters and very high adopters if the adoption index was 1-25, 25-50, 50-75 and 75-100, respectively. The recommended package of practices for dryland crops were given in the package of practices approved by the state department of agriculture in consultation with Acharya N.G. Ranga Agricultural University, Andhra Pradesh. From this package of practices crop specific technologies recommended were identified for quantification. The recommended technologies considered in the present study are given below.

Groundnut: drought tolerant high yielding varieties, seed treatment with imidachloprid followed by tebuconazole / mancozeb / rhizobium / pseudomonas, mulching, gypsum application and earthing-up, sowing with machinery and foliar spray of potassium nitrate.

Bengal gram: drought tolerant high yielding varieties, seed treatment with captan / thiram, mulching, sowing with machinery and foliar spray of KNO3.

Cotton: drought tolerant high yielding varieties, seed treatment with imidachloprid / thiamethoxam / carbosulfan followed by Pseudomonas fluorescens / *Trichoderma viridae* / *T. harzianum* / carbendazim/ mancozeb / captan/ thiram / Bio-Azospirillum and Phosphobacteria, mulching, nipping, sowing with machinery, thinning and gap filling and foliar spray of $MgSO_4$.

Red gram: drought tolerant high yielding varieties, seed treatment with rhizobium / Pseudomonas / captan, mulching, sowing with machinery and foliar spray DAP.

Jowar: drought tolerant high yielding varieties, seed treatment with thiomethaxam / thiram / captan, mulching, thinning and gap filling, foliar spray with ferrous sulphate, and sowing with machinery.

Castor: drought tolerant high yielding varieties, seed treatment with captan / thiram / carbendazim, mulching and foliar spray with carbendazim.

Tobacco: drought tolerant high yielding varieties, de-suckering, curing, mulching and foliar spray with zinc sulphate.

Frequency Distribution of Farmers Adopting Dryland Technology

The details of the respondents adopting dryland technologies crop wise and also district wise are presented in [Table-1]. It could be observed from the table that in the case of groundnut for the combined sample, the adoption of sowing with machinery and choice of drought tolerant high yielding varieties were high (81.54 percent each) followed by foliar spray and mulching which were adopted by 56.92 percent and 50.77 percent of the respondents, respectively. Whereas, seed treatment, gypsum application and earthing-up were adopted by 38.46 percent and 21.54 percent of the respondents, respectively. The rate of adoption was relatively higher in Kurnool district compared to Ananthapur district. Gypsum application and earthing-up happened to be very low probably due to the fact that it is a rainfed crop in a dryland condition. Better rate of mulching may however, enhance yield while reducing weed infestation. In the case of bengal gram use of drought tolerant high yielding varieties were very high (84.31 percent) followed by adoption of sowing with machines (80.39 percent). Mulching was adopted by 64.71 percent of the respondents. Whereas, seed treatment and foliar spray were adopted by 42.16 percent and 40.20 percent of the respondents, respectively. The rate of technology adoption was relatively higher in Prakasam district followed by Kurnool district. It was the least in Ananthapur district. In the case of cotton, adoption of sowing with machinery was the highest (80.6 percent) followed by use of drought tolerant high yielding variety seeds (71 percent). Seed treatment and mulching were adopted by 51.60 percent each. Foliar spray was adopted by 50.00 percent Whereas, thinning and gap filling and nipping were adopted by 21 percent and 14.5 percent of the respondents, respectively, even while thinning and gap filling and nipping happened to be important cultural operations that would enhance yield. The rate of adoption was relatively higher in Prakasam district compared to Kurnool district. In the case of red gram, adoption of sowing with machinery was the highest (84.38 percent) followed by use of drought tolerant high yielding varieties (77.08 percent) and mulching (71.88 percent). Seed treatment and foliar spray were adopted by 32.29 percent and 40.63 percent of the respondents, respectively, whereas these happened to be important operations to enhance seedling vigour and yield. The adoption rate was the highest in Prakasam district followed by Kurnool district. It was the least in Ananthapur district. In the case of jowar, adoption of drought tolerant high yielding varieties was the highest (73.53 percent) followed by sowing with machinery (61.76 percent) and mulching (55.88 percent). Thinning and gap filling, seed treatment and foliar spray were adopted by 35.29 percent, 38.24 percent and 32.35 percent of the respondents, respectively. Jowar was found only in sample farms of Kurnool district. In the case of castor, adoption of drought tolerant high yielding varieties was the highest (78.13 percent) followed by mulching (71.88 percent) and seed treatment (53.13 percent). Whereas, foliar spray was adopted by 43.75 percent of the respondents. Castor was again found only in sample farms of Kurnool district. In the case of tobacco, adoption of curing and mulching were high (82.86 percent each) followed by use of drought tolerant high yielding varieties (80 percent) and foliar spray (51.43 percent).Whereas, adoption of topping and de-suckering was only 37.14 percent. Tobacco was raised only in sample farms of Prakasam district. The technology adoption rate generally remained higher in tobacco.

Adoption Level of Dryland Technologies: Technology Adoption Index

Level of adoption of dryland technologies district wise and crop wise were analyzed through technology adoption index (TAI) and the results presented in [Table-2]. The TAI for each farmer was computed by dividing the number of practices adopted by respondents by total number of practices selected and expressed as percentage. The dryland farmers were categorized in to five categories viz., non-adopters (0), low adopters (1-25), medium adopters (25-50), high adopters (50-75) and very high adopters (75-100) on the basis of their level of adoption measured in terms of TAI. In groundnut, in Ananthapur district, the number of farmers in low and medium adoption categories was high with 24.39 percent each and the mean adoption index stood at 16.67 and 38.33, respectively. Only 12.20 percent were in the very high adoption category with a mean adoption index of 86.67 and high adopters accounted for 19.51 percent with a mean adoption index of 66.67. The non-adopters accounted for 19.51 percent.

Table-1 District wise and Crop wise Frequency Distribution of Sample Respondents Adopting Dryland Technology (Numbers)

Technology	Ananthapur	Kurnool	Prakasam	Total
Groundnut				
Drought tolerant high yielding varieties (HYVs)	33(80.49)	20(83.33)		53(81.54)
Seed treatment	12(29.27)	13(54.17)		25(38.46)
Mulching	22(53.66)	15(62.50)		37(56.92)
Gypsum application and earthing-up	8(19.51)	6(25.00)		14(21.54)
Sowing with machinery	34(82.93)	19(79.17)		53(81.54)
Foliar spray	19(46.34)	14(58.33)		33(50.77)
Total number of farmers	41	24		65
Bengal gram				
Drought tolerant high yielding varieties (HYVs)	19(82.61)	36(81.82)	31(88.57)	86(84.31)
Seed treatment	9(34.78)	16(38.64)	18(51.43)	43(42.16)
Foliar spray	7(26.09)	16(36.36)	18(54.29)	41(40.20)
Mulching	10(43.48)	26(59.09)	30(85.71)	66(64.71)
Sowing with machinery	17(73.91)	35(84.09)	30(82.86)	82(80.39)
Total number of farmers	23	44	35	102
Cotton				
Drought tolerant high yielding varieties (HYVs)		25(69.44)	19(73.08)	44(71.00)
Seed treatment		15(41.67)	17(65.38)	32(51.60)
Nipping		4(11.11)	5(19.23)	9(14.50)
Foliar spray		15(41.67)	16(61.54)	31(50.00)
Mulching		15(41.67)	17(65.38)	32(51.60)
Sowing with machinery		29(80.56)	21(80.77)	50(80.60)
Thinning and gap filling		8(22.22)	5(19.23)	13(21.00)
Total number of farmers		36	26	62
Red gram				
Drought tolerant high yielding varieties (HYVs)	18(66.67)	27(75.00)	29(87.88)	74(77.08)
Seed treatment	6(22.22)	10(27.78)	15(45.45)	31(32.29)
Foliar spray	4(14.81)	15(41.67)	20(60.61)	39(40.63)
Mulching	17(62.96)	24(66.67)	27(81.82)	69(71.88)
Sowing with machinery	23(85.19)	28(77.78)	30(90.91)	81(84.38)
Total number of farmers	27	36	33	96
Jowar				
Drought tolerant high yielding varieties (HYVs)		25(73.53)		25(73.53)
Seed treatment		13(38.24)		13(38.24)
Thinning and gap filling		12(35.29)		12(35.29)
Foliar spray		11(32.35)		11(32.35)
Mulching		19(55.88)		19(55.88)
Sowing with machinery		21(61.76)		21(61.76)
Total number of farmers		34		34
Castor				
Drought tolerant high yielding varieties (HYVs)		25(78.13)		25(78.13)
Seed treatment		17(53.13)		17(53.13)
Foliar spray		14(43.75)		14(43.75)
Mulching		23(71.88)		23(71.88)
Total number of farmers		32		32
Tobacco				
Drought tolerant high yielding varieties (HYVs)			28(80.00)	28(80.00)
Mulching			29(82.86)	29(82.86)
Foliar spray			18(51.43)	18(51.43)
Topping and de-suckering			13(37.14)	13(37.14)
Curing			29(82.86)	29(82.86)
Total number of farmers			35	35

Numbers in parentheses indicate percentages to total

Table-2 Frequency Distribution and Extent of Adoption of Dryland Technology in Sample Farms

Crop/ Category	Groundnut		Bengal gram		Cotton		Red gram		Jowar		Castor		Tobacco	
	No.	AI	No.	AI	No.	AI	No.	AI	No.	AI	No.	AI	No.	AI
Ananthapur district														
0	8 (19.51)	0	5 (21.74)	0			8 (29.63)	0						
01-25	10 (24.39)	16.67	5 (21.74)	20.0			4 (14.81)	20.0						
25-50	10 (24.39)	38.33	5 (21.74)	40.0			6 (22.22)	40.0						
50-75	8 (19.51)	66.67	4 (17.39)	60.0			5 (18.52)	60.0						
75-100	5 (12.20)	86.67	4 (17.39)	82.8			4 (14.81)	82.8						
Total sample	41 (100)	36.99	23 (100)	37.8			27 (35.24)	35.2						
Kurnool district														
0	4 (16.67)	0	7 (15.91)	0	7 (19.44)	0	5 (13.89)	0	9 (28.13)	0	7 (20.59)	0		
01-25	4 (16.67)	16.67	10 (22.73)	20	11 (30.56)	14.29	4 (11.11)	20	4 (12.50)	16.67	7 (20.59)	25.0		
25-50	5 (20.83)	45.83	10 (22.73)	40	6 (16.67)	30.95	9 (25.00)	40	8 (25.00)	33.33	10 (29.41)	50.0		
50-75	5 (20.83)	66.67	8 (18.18)	60	5 (13.89)	60.71	10 (27.78)	60	7 (21.88)	59.72	6 (17.65)	75.0		
75-100	6 (25.00)	94.44	9 (20.45)	90	7 (19.44)	85.71	8 (22.22)	90	4 (12.50)	83.33	4 (11.76)	100.0		
Total sample	24 (100)	49.83	44 (100)	42.95	36 (100)	34.62	36 (48.89)	48.89	32 (100)	38.02	34 (100)	44.85		
Prakasam district														
Crop/ Category	Groundnut		Bengal gram		Cotton		Red gram		Jowar		Castor		Tobacco	
	No.	AI	No.	AI	No.	AI	No.	AI	No.	AI	No.	AI	No.	AI
0			4 (11.43)	0	5 (19.23)	0	2 (6.06)	0					6 (17.14)	0
01-25			3 (8.57)	20.00	6 (23.08)	14.29	3 (9.09)	20.0					5 (14.29)	20.00
25-50			11 (31.43)	40.00	7 (26.92)	38.10	12 (36.36)	40.0					7 (20.00)	40.00
50-75			10 (28.57)	60.00	4 (15.38)	68.57	9 (27.27)	60.0					11 (31.43)	60.00
75-100			7 (20.00)	91.43	4 (15.38)	85.71	7 (21.21)	95.0					6 (17.14)	93.33
Total sample			35 (100)	49.71	26 (100)	37.29	33 (100)	52.88					35 (100)	45.71
Combined districts														
0	12 (18.46)	0	16 (15.69)	0	12 (19.35)	0	15 (15.63)	0	9 (28.13)	0	7 (20.59)	0	6 (17.14)	0
01-25	14 (21.54)	16.67	18 (17.65)	20.00	17 (27.42)	14.29	11 (11.46)	20.00	4 (12.50)	16.67	7 (20.59)	25.0	5 (14.29)	25.0
25-50	15 (23.08)	42.22	26 (25.49)	40.00	13 (20.97)	35.16	27 (28.13)	40.00	8 (25.00)	33.33	10 (29.41)	50.0	7 (20.00)	40.0
50-75	13 (20.00)	66.67	22 (21.57)	60.00	9 (14.52)	65.08	24 (25.00)	60.00	7 (21.88)	59.72	6 (17.65)	75.0	11 (31.43)	60.0
75-100	11 (16.92)	90.91	20 (19.61)	88.00	11 (17.74)	85.71	19 (19.79)	88.42	4 (12.50)	83.33	4 (11.76)	100	6 (17.14)	93.33
Total sample	65 (100)	42.05	102 (100)	43.92	62 (100)	35.95	96 (100)	46.04	32 (100)	38.02	34 (100)	44.85	35 (100)	45.71

Numbers in the parentheses indicate percent to total, AI: Adoption Index

The TAI for all farmers in Ananthapur district was 36.99 percent. In Kurnool district, the number of farmers in very high adoption category was high with 25.00 percent with a mean adoption index of 94.44. This was followed by the medium and high adoption categories which accounted for 20.83 percent each with a mean adoption index of 45.83 and 66.67, respectively. The mean value of the technology adoption index for all farmers was low in Ananthapur district with 36.99 percent, whereas, it was comparatively higher in Kurnool district with 49.83 percent. The analysis would reveal greater proportion of sample farmers in Kurnool district having high and very high adoption indices. In the combined sample, the number of farmers in medium adoption category was higher with 23.08 percent with an adoption index of 42.22. This was followed by low and high adoption categories with 21.54 percent and 20.00 percent.

The non-adopters accounted for 18.46 percent. Only 16.92 percent were in very high adoption category with an adoption index of 90.91. The mean value of the technology adoption index for all farmers in both the districts was 42.05. It shows that the technology adoption level was less than 50 percent indicating the existence of larger scope to improve which would result in better yield of groundnut crop in dryland areas of Andhra Pradesh. In bengal gram, in Ananthapur district, the number of farmers in non-adoption, low and medium adoption categories was high with 21.74 percent each with an adoption index of zero, 20.00 and 40.00, respectively. Only 17.39 percent each were in the high and very high adoption categories with a mean adoption index of 60.00 and 82.80 percent, respectively. Whereas, in Kurnool district the number of farmers in low and medium adoption categories was relatively higher with 22.73 percent each with an adoption index of 20.00 and 40.00 respectively and 20.45 percent were in very high adoption category with a mean adoption index of 90.00. This was followed by high adoption category which accounted for 18.18 percent with a mean adoption index of 60.00. The non-adopters accounted for 15.91 percent. In Prakasam district, the number of farmers in medium adoption category was high with 31.43 percent with an adoption index of 40.00. This was followed by high and very high adoption categories which accounted for 28.57 percent and 20.00 percent with a mean adoption index of 60.00 and 91.43, respectively. The non-adopters and low adopters accounted for 11.43 percent and 8.57 percent, with a mean adoption index of zero and 20.00, respectively. The mean value of technology adoption index for all farmers was low in Ananthapur district with 37.80 percent, whereas, it was comparatively higher in Kurnool district with 42.95 and highest in Prakasam district with 49.71. In combined sample, the number of farmers in medium adoption category was higher with 25.49 percent with an adoption index of 40.00. This was followed by high, very high and low adoption categories which accounted for 21.57 percent, 19.61 percent and 17.65 percent with a mean adoption index of 60.00, 88.00 and 20.00. The non-adopters accounted for 15.69 percent. The mean value of technology adoption index for all farmers was at 43.92. It could also show the scope for increasing technology adoption for higher yield in bengal gram. In cotton, in Kurnool district, the number of farmers in low adoption category was higher with 30.56 percent with an adoption index of 14.29. The number of farmers in very high adoption category was only 19.44 percent with an adoption index of 85.71. This was followed by medium and high adoption categories with 16.67 percent and 13.89 percent of farmers with an adoption index of 30.95 and 60.71, respectively. The non-adopters accounted for 19.44 percent. The mean TAI stood at 34.62. In Prakasam district the number of farmers in medium adoption category was high with 26.92 percent with an adoption index of 38.10. This was followed by low adoption category with 23.08 percent with an adoption index of 14.29. Only 15.38 percent each were in high and very high adoption categories with an adoption index of 68.57 and 85.71, respectively. The mean value of technology adoption index for all farmers was low in Kurnool district with 34.62 and comparatively high in Prakasam district with 37.29. In combined sample, the number of farmers in low adoption category was high with 27.42 percent with an adoption index of 14.92. This was followed by medium, very high and high adoption categories with 20.97 percent, 17.74 percent and 14.52 percent with an adoption index of 35.16, 85.71 and 65.08. The non-adopters accounted for 19.35 percent. The mean value of technology adoption index for all farmers was at 35.95. The analysis would thus show, on the average only a little more than a third of the technologies recommended were adopted leaving a larger scope to improve the adoption level for better yields. Unlike groundnut and bengal gram, cotton is a relatively long duration crop with greater need for plant protection and staggered harvest bearing greater risk, warranting innovative policies to enhance yield and returns. In redgram, in Ananthapur district, the number of farmers in non-adoption category was the highest with 29.63 percent. This was followed by medium and high adopters with 22.22 percent and 18.52 percent with an adoption index of 40.00 and 60.00, respectively. Only 14.81 percent of the farmers were in very high adoption category with an adoption index of 82.8. In Kurnool district the number of farmers in high adoption category was high with 27.78 percent with an adoption index of 60.00. This was followed by medium and very high adoption categories with 25.00 percent and 22.22 percent with an adoption index of 40.00 and 90.00, respectively. The non-adopters accounted for 13.89 percent. In Prakasam district, the number of farmers in medium adoption category was high with 36.36 percent with an adoption index of 40.00. This was followed by the high and very high adoption categories which accounted for 27.27 percent and 21.21 percent with a mean adoption index of 60.00 and 95.00, respectively. The non-adopters accounted for only 6.06 percent. The mean value of technology adoption index for all farmers was high in Prakasam district with 52.88 followed by Kurnool district with 48.89 and it was very low in Ananthapur district with 35.24. In the combined sample, the number of farmers in medium adoption category was the highest with 28.13 percent. This was followed by high and very high adopters with 25.00 percent and 19.79 percent with an adoption index of 60.00 and 88.42 percent, respectively. Non-adopters accounted for 15.63 percent. The mean value of technology adoption index was 46.04. The results would thus reveal a relatively better adoption of technologies in red gram compared to other crops, still indicating scope for improvement. In jowar, in Kurnool district, the number of farmers in non-adoption category was high with 28.13 percent. Medium adopters accounted for 25.00 percent with an adoption index of 33.33 followed by high adopters with 21.88 percent with an adoption index of 59.72. Only 12.50 percent were in the very high adoption category with a mean adoption index of 83.33 percent. The mean value of technology adoption index for all the farmers was 38.02 percent indicating the need to improve the technology adoption level. In castor, in Kurnool district, the number of farmers in medium adoption category was high with 29.41 percent with an adoption index of 50.00. Non-adopters and low adopters accounted for 20.59 percent each with the adoption index at zero and 25.00 respectively. This was followed by high adopters with 17.65 percent with an adoption index of 75.00. Only 11.76 percent were in very high adoption category with an adoption index of 100. The mean value of technology adoption index for all the farmers was 44.85 percent, which was relatively better compared to crops like cotton. In tobacco, in Prakasam district, the number of farmers in high adoption category was high with 31.43 percent with an adoption index of 60. This was followed by medium and very high adoption categories with 20.00 percent and 17.14 percent with an adoption index of 40.00 and 93.33 percent. The non-adopters accounted for 17.14 percent. The mean value of technology adoption index for all the farmers was 45.71 percent.

Conclusion

It could thus be inferred that; across crops drought tolerant high yielding variety was adopted between 71.0 percent and 84.31 percent; with the exception of castor and tobacco, sowing with machinery was adopted between 61.76 percent and 84.38 percent indicating higher rate of adoption. The medium range adoption included; seed treatment between 32.29 percent and 53.13 percent, mulching between 51.60 percent to 82.86 percent and foliar spray between 32.35 percent to 51.43 percent. With the exception of curing for tobacco all the remaining technologies like gypsum application and earthing-up in groundnut, nipping, thinning and gap filling in cotton and topping and de-suckering in tobacco were adopted between 14.5 percent and 37.14 percent of the farmers. The percentage of farmers adopting dryland technologies was high in Prakasam district followed by Kurnool and Ananthapur districts. The analysis would show that the number of farmers in the medium adoption category was higher compared to all other adoption categories in groundnut, bengal gram, red gram and castor with 23.08 percent, 25.49 percent, 28.13 percent and 29.41 percent, respectively, with an adoption index of 42.22, 40.00, 40.00 and 50.00, respectively. In the case of cotton, jowar and tobacco the number of farmers in the low adoption, non-adoption and high adoption categories was high with 27.42 percent, 28.13 percent and 31.43 percent, with an adoption index of 14.29, zero and 60, respectively. The mean value technology adoption index was found to be the highest in red gram with 46.04 percent followed by tobacco with 45.71 percent, castor with 44.85 percent, bengal gram with 43.92 percent, groundnut with 42.05 percent, jowar with 38.02 percent and cotton with 35.95 percent. The mean technology index thus, remained between 35.95 percent and 46.04 percent among the crops and across the districts. The analysis would also show that the overall technology adoption index was high in Prakasam district followed by Kurnool district and it was low in Ananthapur district for any of the crops grown across these districts.

The overall dryland technology adoption ranged between 35.95 and 46.04 percent among the crops and across the districts. This needs to be enhanced. The study indicates that the Ananthapur district lags behind in terms of technology adoption, yield and income of many crops in relation to other districts. Therefore, special drive is required to address agricultural problems in the district to help to improve agricultural production in general and farmers income in particular.

Application of research: This study is useful to assess the level of technology adoption in dryland crops in the country and by taking appropriate steps to increase the level of technology adoption may lead to improvement in the yield and income of the dryland farmers.

Research Category: Agricultural Economics, Production Economics

Abbreviation: TAI: Technology Adoption Index; M ha: Million hectares; t/ha: tonnes per hectare; MT: Metric tonnes; mm: millimeters; L ha: Lakh hectares; TE: Triennium ending

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