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EFFECT OF DIFFERENT CROP MANAGEMENT PRACTICES ON GROWTH AND YIELD OF FIELDPEA

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ABSTRACT

A field experiment was conducted during *Rabi* season of the year 2013-14, 2014-15 and 2015-16 at Pulses Research Station, S. D. Agricultural University, Sardarkrushinagar, Gujarat to study various crop management practices for better growth and higher yield in Fieldpea (*Pisium sativum* L.). The eight crop management treatments *viz.*, Control, Integrated nutrient management, integrated weed management, integrated pest management and their combinations were studied in randomized block design with three replications. The results revealed that treatment T_5 (INM + IWM) recorded significantly highest seed yield (2837 kg/ha) of fieldpea over rest of the treatments in first year while in remaining two years T_8 (INM + IWM + IPM) recorded significantly higher seed yield (2100 kg/ha and 2029 kg/ha, respectively), While in case of three years pooled results shows treatment T_5 combination of integrated nutrient (Recommended dose of fertilizer + *Rhizobium* + PSB) and weed management (Pendimethalin @ 1 kg a.i /ha + one hand weeding at 30 days after sowing) recorded significantly higher seed yield (2206 kg/ha) of fieldpea. Combination of integrated nutrient (RDF + *Rhizobium* + PSB) and weed management (Pendimethalin @ 1 kg a.i /ha + one hand weeding at 30 DAS) had relatively more fieldpea seed yield.

Abbreviations: INM: integrated nutrient management, IWM: integrated weed management, IPM: integrated pest management, HW: hand weeding, DAS: days after sowing

INTRODUCTION

Pea is an important pulse crop grown in India. India is the fifth largest producer in the world. Apart from India, other major producers of pea are USA, China, France, UK etc. Fieldpea or dry pea (*Pisum sativum* L.) is the one of the most important *rabi* season pulse crop in India, the major pea growing states are Uttar Pradesh, Bihar, Haryana, Punjab, Himachal Pradesh, Orissa and Karnataka. In India, it is grown over an area of 0**.**78 million hectares with a production of 0.71 million tonnes (Anonymous, 2010). The area and production of pulse crops is about 7.84 lakh ha and 6.02 lakh tonnes, respectively in the Gujarat state (Anonymous, 2011). Among the pulses, pea is one of the most important pulse crops containing about 22.5 per cent protein, 60.4 per cent carbohydrates, vitamin A and C, Ca, phosphorous and has high levels of amino acids lysine and tryptophan. It is a highly prized pulse for its high nutritional value of grains, fodder as rich feed for animal, green manure and bio-agents for soil conservation. Pea is gaining importance due to its hardiness, comparatively more resistance against the pests and diseases and ability to withstand against the drought conditions. There is a great scope of increasing the productivity of this crop with adoption of high yielding varieties and agro technologies, such as optimum plant population, proper management of water, fertilizers, bio-fertilizers and weed management (Desai *et al*., 2016). Integrated weed management system is a desired practice that aims at reducing the dosage of herbicide to be applied with mechanical weeding, which will help in managing weeds in a best way for realizing to sustain and boost the production of fieldpea (Bali *et al*., 2016). Its cultivation maintains soil fertility through biological nitrogen fixation in association with symbiotic *Rhizobium* prevalent in its root nodules and thus plays a vital role in fostering sustainable agriculture. There fore it becomes imperative to evaluate the different crop management practices which are safe to the crop and at the same time provide effective and higher production (Anupama *et al*., 2012). In this aspect a field experiment was conducted with the objective to find out effective integrated crop management techniques using nutrient management with fertilizer and bio-fertilizers, weed management with mechanical and chemical control and chemical pest control for better growth and higher yield in fieldpea under North Gujarat conditions.

MATERIALS AND METHODS

A field Experiment was conducted during *Rabi* season of the year 2013-14, 2014-15 and 2015-16 at the farm of Pulses Research Station, Sardar krushi nagar Danti wada Agricultural University, Sardar krushi nagar, Gujarat. The soil of experimental plot was Loamy sand in texture, low in organic carbon (0.61 %), medium in available nitrogen (275 kg/ha) and phosphorus (46.13 kg/ha) and high in potash (213.40 kg/ha). Experiment was laid out in a randomized block design with eight treatments *viz*., T_1-Control, T_2-Integrated nutrient management (Recommended dose of fertilizer + *Rhizobium*

+ PSB)- INM, T_3-Integrated weed management (Pendimethalin @ 1 kg a.i /ha + one hand weeding at 30 days after sowing) – IWM, T_4-Integrated pest management (seed treated with fungicide + diseases and insect pest management as and when required)- IPM, T_5 - INM + IWM, T_6 - INM + IPM, T_7 - IWM + IPM, T_8 - INM + IWM + IPM and replicated three times in Randomized Block Design. Herbicides were applied with their respective doses as per treatments; Spraying was done with flat fen nozzle with knapsack sprayer using 500 liter water per hectare. Weed flora and dry weight of weeds were taken using quadrate of one m^2 size at 30 days after sowing. Weed data were subjected to square root transformation ("x+0.5) for uniformity before statistical analysis. Yield attribute characters, seed and straw yield recorded following standard practices. Rests of the agronomical practices were carried out as per recommendation adhering to the schedule. Weed control efficiency (WCE) and weed index and Per cent yield increase over control using in this experiment were calculated using the following formula:

WCE (%) = [(Dry matter of weeds in unweeded control - Dry matter of weeds in Treated plot) × 100] / Dry matter of weeds in unweeded control plot

WI (%) = [(Maximum yield from the treatment - Yield from the treated plot for which WI to be worked out) × 100] / Maximum yield from the treatment

Yield Increase over Control (%) = [(Yield from the treatment - Yield from control Plot) × 100] / Yield from control plot

RESULTS AND DISCUSSION

Significantly lowest weed density (3.85 / m^2) and dry weight of weeds (2.64 g/m^2) at 30 DAS was found in T_7 *i.e.*, integrated combination of weed management and pest management. It was remained at par with T_8 (INM + IWM + IPM) in case of weed density while remained at par with T_8 (INM + IWM + IPM) and T_5 (INM + IWM) in the respect of dry weight of weeds. Highest weed control efficiency at 30 DAS (89.00 %) due to lower weed dry matter accumulation recorded in T_7 and followed by T_5. lowest yield reduction due to weeds (weed index) recorded in T_5 (0.0 %) followed by T_8 (3.81 %) (Table 1). From all the management practices, weed management alone or in combination with other management practices significantly improved the yield and yield attributing parameters over control. The pooled results of the present experiment showed that the yield attributing characters *i.e.*, plant height (58.80 cm), number of seeds per pod (5.93) and 100 seed weight (18.82 g) of fieldpea were recorded highest

Table 1 : weed density, weed dry weight, weed control efficiency, weed index and Seed yield as influenced by different Crop management practices (Three Years Pooled)

Treatment	Weed density at 30 DAS (No./m2)	Weed dry weight at 30 DAS(g/m2)	WCEat 30 DAS (%)	Weed index (%)	Seed yield (kg/ha) 2013-14	2014-15	2015-16	pooled	% yield increase over control (pooled)
T_1	6.02 (34.08)	4.89 (24.04)	0.00	44.42	1674	987	1016	1226	0.00
T_2	5.61 (29.40)	4.75 (22.22)	7.59	18.27	2200	1629	1581	1803	47.06
T_3	2.72 (6.40)	2.28 (4.79)	80.08	20.99	2057	1608	1563	1743	42.17
T_4	5.43 (27.69)	4.60 (21.20)	11.81	34.45	1763	1299	1275	1446	17.94
T_5	2.75 (6.58)	1.90 (3.10)	87.10	0.00	2837	1871	1909	2206	79.93
T_6	5.73 (30.83)	4.83 (23.37)	2.80	21.62	2243	1446	1497	1729	41.03
T_7	2.19 (3.85)	1.75 (2.64)	89.00	17.72	2126	1674	1644	1815	48.04
T_8	2.46 (5.07)	2.05 (3.87)	83.92	3.81	2237	2100	2029	2122	73.08
S. Em. ±	0.17	0.14	–	–	114.3	65.4	109.24	57.04	–
C.D. at 5%	0.47	0.41	–	–	347	198	331.30	162.79	–
C.V.%	12.11	12.38	–	–	9.24	7.18	12.10	9.72	–
Y × T	NS	NS	–	–	–	–	–	NS	–

Table 2 : Growth and Yield attributes as influenced by different crop management practices (three years pooled)

Treatment	Plant height (cm)	Number of branches plant^{-1}	Number of Pods plant^{-1}	Number of seeds per pod	100 seed weight (g)	Straw yield (kg ha^{-1})
T_1	48.47	1.38	12.22	4.98	17.91	2210
T_2	56.04	1.71	17.13	5.51	18.18	3354
T_3	54.19	1.82	14.22	5.62	18.05	2959
T_4	54.13	1.76	15.47	5.42	18.30	3104
T_5	58.80	2.02	19.47	5.93	18.82	3415
T_6	57.98	1.82	16.40	5.24	18.44	3150
T_7	54.16	1.98	16.99	5.69	17.92	3434
T_8	55.33	2.00	20.60	5.69	18.81	3648
S. Em. ±	2.18	0.09	0.61	0.21	0.26	129.77
C.D. at 5%	NS	0.26	1.75	NS	NS	370.37
C.V.%	11.89	15.09	11.09	11.21	4.23	12.32
Y × T	NS	NS	3.03	NS	NS	NS

at harvest under T_5 combination of nutrient management and weed management practices (Table-2). Number of pods per plant (20.60) and straw yield (3648 kg/ha) recorded higher in the T_8 combination of all management practice *i.e.*, nutrient, weed and pest management which remained at par with T_7, T_5 and T_2 for straw yield and T_5 at par for number of pods per plant. In first year treatment T_5 (INM + IWM) recorded significantly the highest seed yield (2837 kg/ha) of fieldpea over rest of the treatments while in remaining two years T_8 (INM + IWM+IPM) recorded significantly higher seed yield (2100 kg/ha and 2029 kg/ha, respectively), While in case of three years pooled results shows the treatment T_5 (INM + IWM) recorded significantly higher seed yield (2206 kg/ha) of fieldpea over rest of the treatments and found significantly at par with T_8 (INM + IWM+IPM), and interaction of year and treatment was found non-significant (Table-1). Results were conformity with the finding of Jha and Soni. (2013), Bhat *et al*. (2013) and Kumar *et al*. (2014). Due to periodical removal of weeds by hand weeding and herbicidal control resulted in remarkable reduction in weed population and ultimately less dry weight of weeds provides weed free environment and less competition to the crop which resulted in the availability of nutrients in appropriate quantity which provides better growth to crop. These is in agreement with the findings of Chaudhari *et al*. (2016).

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