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SHORT COMMUNICATION

PERFORMANCE OF CHEWING TOBACCO POLY TRAY SEEDLINGS UNDER LEVELS OF NITROGEN AND DRIP IRRIGATION

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In Tamil Nadu, chewing tobacco is grown in an area of 10,000 to 15,000 ha. Generally farmers raise chewing tobacco seedlings by traditional methods where raised seed beds of 15 cm height are formed and seeds sown .The seedlings are pulled out at 45 days after sowing from the nursery and transplanted in the main field. In this method the establishment of seedlings will be slow and there will be seedling mortality rate and the gaps needed to be transplanted again. In recent years polytrays are used in most of the high value crops for raising seedlings. Seedlings raised in polytrays are cost effective, free from soil borne diseases, seedlings have uniform growth, cent per cent establishment, improves the resource use efficiency and increases the yield. In the last two decades the ground water recharge has become poor and irrigating agricultural crops by surface method has become difficult task and drip irrigation becoming popular over traditional irrigation methods as it gives more yield and income (Pawar *et al.,* 2002). Further, the nutrient use efficiency in drip irrigation would be higher > 90% and relatively less leaching loss <10% resulting in higher productivity in agricultural crops (Sankaranarayanan,2010). Not much is known about the performance of poly tray seedlings with when transplanted and grown with fertigation. The present study aims at evaluating the suitability of drip irrigation coupled with nitrogen application for poly tray grown chewing tobacco seedlings.

The study was conducted during *rabi* season of 2016 -17 at the experimental farm of ICAR CTRI Research Station, Vedasandur (latitude 10° 32'N longitude 77° 57'). The soil of the experimental site was Alfisols with alkaline pH (8.1), low in organic carbon (0.40 %), low in available N (210 kg/ha) , P (6.5 kg/ha) and medium in available K (275 kg/ha). The main plot treatments comprised of three drip irrigation levels *viz.*100, 75 and 50% ETc and the surface irrigation as reference. The sub plots comprised of three levels of Nitrogen *viz.*100,75 and 50 % RDN/ha. The recommended dose of fertilizer for chewing tobacco is 125 + 50 + 50 kg N +P_2O_5+ K_2O /ha. The experiment was conducted in a split plot design with 3 replication. The conventional method of seedlings were raised first and then twenty five days old seedlings were resetted in poly trays with the potting medium of composted coir pith and FYM in the ratio of 1:1 under shade net. The coir pith medium was fortified with single super phosphate @ 300 g , 250 g of Ammonium sulphate,150 g of K_2SO_4, and 200 g of $MgSO_4$ per 100 kg of medium, Blitox @ 2 gm/litre was sprayed on the medium to avoid soil borne diseases. Seedlings of 60-65 days are transplanted in the main field. Phosphorus 44 kg P/ha as super phosphate was mixed with 2.5 t/ ha of sieved farm yard manure and spot applied Potassium as MOP was applied at 40 days after transplanting (DAT). Nitrogen was applied at 40 and 60 DAT. The first top dressing of N (50%) was applied in the form of urea and the second top dressing of N (50%) was applied in the form of Ammonium sulphate. The top dressed fertilizers were kept near the root zone.. The drippers were kept near the root zone of the seedlings and the pressure gauge was maintained at 1.5 kg/cm^2.The mean daily USWB class-A pan evaporation rate was 4.24 mm in 2017-18.

Water requirement (WR) or ETc (lpd)=CPE Kp Kc Wp S

Where, ETc is Crop evapo transpiration; lpd is liters/day; CPE is Cummulative pan evaporation (mm); Kp is Pan factor (0.7); Kc is Crop coefficient; Wp is Wetting area Percentage (80%); S is Crop spacing (0.9 m x 0.75m).

Key words: Poly tray seedlings, Chewing tobacco, Drip irrigation, Nitrogen

The Kc values were 0.4, 0.8, 1.15 and 0.90 for initial stage (1-25 days), Crop development stage (26-60 days), mid season stage (61-85 days) and late season stage (86-120 days), respectively. Three flood irrigations at the rate of 3 ha-cm was given to all the treatments at the initial stage of the crop (0-25 days) for seedlings establishment. The quantum of water irrigated at different stages of the crop is given in Table.1. Effective rainfall was calculated by following a water balance method. Total rainfall received was 257.84 mm during the crop period. Chewing tobacco hybrid VDH 3 was used for planting. The hybrid VDH 3 is a Sun cum smoke cured tobacco with medium inter nodal length and leaf width moderately puckered surface having prominent mid ribs and venation. Weeding was done manually at 20 days after transplanting. Earthing up operation was done at 40 DAT by spade. The crop was topped at 60-65 days and the suckericide "power 10" was applied to the top three axils to control the suckers. The crop was harvested by stalk cut method at 120 DAT. The first grade leaf yield (FGLY) and total cured leaf yield (TCLY) were recorded after sun curing and standard fermentation process. The package of practices and chewability scores for chewing tobacco was followed as per the recommendation of ICAR CTRI Research Station, Vedasandur (Kumaresan *et al.*,2019). Economics was calculated as per the cost of inputs and the value of cured leaf realized.

The leaf length and leaf width with respect to drip irrigation at 100% ETc and surface irrigation are comparable. Drip irrigation at 50% ETc recorded a lower leaf length and width. Similar trend was observed for FGLY and TCLY also. The highest FGLY of 2900 kg/ha was recorded with drip 100% ETc followed by 75% ETc. Drip irrigation at 100% ETc significantly increased the TCLY by 5 % as compared to surface irrigation. The highest TCLY of 3714 kg/ha was obtained with drip 100% ETc was significantly superior over the surface irrigation (3543 kg/ha) and drip at 50 % ETc (3489 kg/ha).The higher yield in drip irrigation systems might be due to the fact that frequent watering results in higher water potential thus minimizing fluctuation in soil moisture in effective root zone (Hanson *et al.,* 1997). In Chewing tobacco, Kumaresan *et al.*(2013) reported an increased first grade leaf yield and total cured leaf yield with drip at 100% ETc. The TCLY with drip at 100% ETc and 75 % ETc are comparable (Table.2).The cost of cultivation was higher (Rs.1,14,600/ha) with the surface irrigation followed by drip irrigation at 100% ETc. Higher Gross returns of Rs. 2,41,000 / ha. was recorded with drip irrigation at 100% ETc followed by drip irrigation at 75% ETc.Drip irrigation at 50% ETc recorded the lowest gross returns of Rs.2,26,800/ha. Drip irrigation at 100% ETc significantly increased the net returns by 12 % over the surface irrigation. The net return with 100% ETc and surface irrigation was Rs.1,28,200/ ha and 1,14,800/ha respectively. The B:C ratio was significantly higher with 100% ETc (2.13) as compared to the surface irrigation(2.0).

Nitrogen at 100% RDN increased the leaf length and leaf width. The cured leaf yield viz., FGLY and TCLY significantly increased with 100%

Table 1: Cumulative pan evaporation, rainfall and quantum of irrigation water used under various irrigation treatments at different crop stages.

Crop stages	CPE (mm)	Rainfall (mm)	Effective Rain fall (mm)	Quantum of water used (ha-mm)			
				Drip			Surface Irrigation
				100% ETc	75% ETc	50% ETc	
Initial stage (0-25 days)	100.4	59.0	8.8	61.2	45.8	30.6	86.5
CDS* (26-60 days)	124.8	144.4	6.6	61.2	45.8	30.6	103.8
Mid season stage(61-85 days)	93.4	52.3	36.6	57.3	57.3	38.3	121.1
Late season stage(86-120 days)	19.6	2.2	2.2	80.2	80.2	53.6	138.4
Total	**509.2**	**257.8**	**53.6**	**229.0**	**229.0**	**153.0**	**450.0**

* CDS-Crop development stage

Table 2: Effect of poly tray seedlings, levels of irrigation and nitrogen on the yield of Chewing tobacco

Treatments	Leaf length (cm)	Leaf width (cm)	FGLY* (kg/ha)	TCLY** (kg/ha)	Cost of cultivation (Rs/ha)	Gross return (Rs/ha)	Net return (Rs/ha)	B:C ratio	Quantum of water used (ha-mm)	WUE (kg/ha-mm)	Water saving (%)
Irrigation levels											
Drip 100% ETc	75.1	44.1	2900	3714	113200	241400	128200	2.13	306	12.1	32
Drip 75% ETc	74.3	43.0	2811	3566	112600	231800	119200	2.06	229	15.6	49
Drip 50% ETc	71.5	42.1	2389	3489	112100	226800	114700	2.02	153	22.8	66
Surface irrigation	74.6	43.5	2771	3529	114600	229400	114800	2.00	450	7.87	-
SEm	0.35	0.38	37.4	51.9	-	4000	3410	0.03	-	-	-
CD at 5%	1.02	1.33	131.8	183.4	-	126000	10260	0.09	-	-	-
Nitrogen levels											
100% RDN	76.1	44.2	2866	3746	113800	243400	129600	2.14	285	13.1	-
75% RDN	73.9	43.4	2743	3683	113200	239400	126200	2.12	285	12.9	-
50% RDN	71.7	41.9	2620	3456	112300	224600	112300	2.00	285	12.1	-
SEm	0.34	0.50	67.6	68.1	-	6260	4770	0.04	-	-	-
CD at 5%	1.01	1.49	183.5	205.7	-	14200	16200	0.12	-	-	-

*FGLY-First grade leaf yield; **TCLY- Total cured leaf yield

RDN as compared to 50% RDN. The gross return (Rs.2,43,400/ha), net return (Rs.1,29,600/ha) and B:C ratio (2.14) was higher with 100% RDN followed by 75% RDN. Kumaresan *et al.*,(2019) reported an increased total cured leaf yield of 17.2% and net returns with 100% RDN through drip fertigation over surface irrigation.

The quantum of water used was higher with surface irrigation (450 ha-mm) and lower with drip treatments (153 to 306 ha-mm).The water saving was higher with 50% ETc and the yield was less. The TCLY was higher with 100% ETc with a mean water saving of 32%. It could be said that additional area could be brought under drip with the same quantity of water per unit area irrigated with surface method of irrigation. The water saving in drip include irrigation of smaller portion of the soil volume, decreased surface evaporation, reduced runoff from the drip field and controlled deep percolation losses below the crop root zone. Water use efficiency (WUE) was higher with drip treatments (12.1 to 22.8%) as compared to surface irrigation (7.83%).The enhanced WUE in drip system is because, the irrigation is given to a smaller portion of the soil volume. It is obvious that WUE is the function of the ratio of economic produce (TCLY) to the consumptive use of water (mm), the productivity of cured leaf yield per-ha-mm of water used decreased in TCLY was not in proportion to the increase in consumptive use of water, thereby decreased WUE under surface method of irrigation. Kumaresan *et al.*(2019) reported a decreased WUE under surface irrigation. Nitrogen at 100% RDF increased the WUE (13.1 kg/ha-mm) as compared to the other two levels. The higher WUE at 100% RDN could be attributed to the higher total cured leaf yield. Kumaresan *et al.*, (2008) reported an increased WUE with higher dose of Nitrogen when irrigation was combined with N. Water saving varied between 33 to 66% with drip irrigation as compared to surface irrigation. It could be concluded from the study that for polytray tobacco seedlings drip irrigation at 100% ETc and 100% RDN is essential for higher yield and net returns.

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