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Research Article

STUDIES ON THE EFFECT OF DIFFERENT LAND LEVELLING TECHNIQUES ON WEED POPULATION IN GROUNDNUT *(ARACHIS HYPOGAEA* L.*)*

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Abstract- The field studies were conducted in the research farm of the University of Agricultural Sciences (UAS) Raichur during the *kharif* seasons of 2013 and 2014 to determine the effects of traditional and laser land leveling techniques on weed population in groundnut production. Pooled mean of number of weeds per m^2 indicated that number of weeds per m^2 was significantly lesser compared to traditionally levelled plot and the plot with no leveling. The control plot recorded the highest number of weeds per m^2. Laser land levelling facilitated in uniform moisture distribution in the entire field, crop stand and growth resulting in lesser weed infestations.

Keywords- Groundnut, Laser land leveling, Weed count, Traditional land leveling

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Introduction

In agriculture, land development plays a key role because undulating topography of the soil surface has a major impact on the germination, water saving and crop yield and weed load. Precision land levelling with laser technology improves crop establishment and reduces weed intensity [4]. Reduction in weed population is also most likely in laser land levelling, which creates almost uniform seedbed with uniform storage of moisture and nutrients that helps in uniform germination of crops. Unlevelled fields on the other hand, frequently exhibit patchy growth. The areas with sparse plant population are zones of higher weed population because weeds are mostly C4 plants and possess the inherent genetic capability to suppress the crop growth. Reports on suppression of weed population by laser land levelling, though meager, convincingly prove its beneficial effects. Reduction in weed population up to 40 % was reported due to controlling effect from land levelling. It was reported that a marked reduction in weed population in wheat at 30 days after sowing was recorded under precision levelling compared to traditional levelling [1]. However, no such data on effect of laser land levelling on weed population in groundnut production was available. As weeding is a major problem in ground nut production, It was therefore, felt necessary to evaluate effect of different land levelling techniques on weed population in groundnut production as this region falls under major groundnut growing areas of India.

Materials and Methods

Study location: The field studies were conducted in the research farm of the University of Agricultural Sciences (UAS) Raichur during the *kharif* seasons of 2013 and 2014 to determine the effect of traditional and laser land leveling techniques on weed population in groundnut production. The field experiments were conducted with groundnut variety TMV-2 in the medium textured clay soils. The experimental site falling under the North-eastern dry zone of Karnataka was situated at 16° 11' N latitude and 77°19' E longitude with an altitude of 389 m above the MSL. The field experiment was laid out in a split plot design with leveling methods *viz.*, L_1-laser land leveling with 0.2% slope, L_2-laser land leveling with 0.4% slope, L_3-traditional land leveling method and L_4-no leveling (control) as main treatments and irrigation methods *viz.*, I_1-border strip irrigation and I_2-check basin irrigation as sub-treatments. It was replicated four times.

Laser leveller: A commercial unit of laser guided land leveller (Model GL-522) was used for the study and one directional slopes of 0.2 and 0.4 % were given. [Fig-1] shows thematic flow chart of laser levelling concept indicating automatic land leveling with the help of sensors.

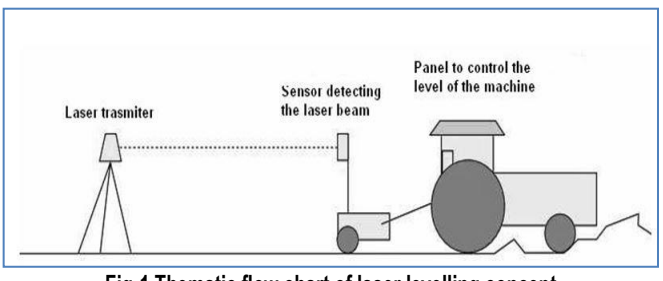

Fig-1 Thematic flow chart of laser levelling concept

Number of weeds: Number of weeds (both monocots and dicots) at 30 days after sowing (DAS) in randomly selected area of 1 m^2 were counted in all treatments and average value was used. Weeding operation was taken after counting of weeds. Uniform weed management practices were followed in all the treatments.

Results and Discussion

The data on number of weeds per m^2 in groundnut at 30 DAS as influenced by different land leveling and irrigation methods are presented in [Table-1] and [Fig-2]. It was seen that the pooled mean of number of weeds per m^2 of 24.58 was the lowest under laser leveling with 0.4 per cent slope (L2). It was 27.27 in plot under laser leveling with 0.2 per cent slope (L1). Both were on par with each other. But number of weeds per m^2 was significantly lesser compared to traditionally levelled plot (L3) and the plot with no leveling (L4). The control plot (L4) recorded the highest number of weeds per m^2 (44.71) which were significantly higher than that of L3 (35.69). But, both the irrigation methods did not affect significantly on the number of weeds per m^2. The interaction effects were also non-significant. The data on number of weeds per m^2 revealed the same trend during 2013 and 2014. Results revealed that land leveling methods significantly influenced number of weeds in groundnut at 30 DAS. Pooled mean of number of weeds per m^2 indicated that significantly lower weed count was recorded in L2, which was on par with L1. It was mainly due to laser land leveling as it facilitated in uniform moisture distribution in the entire field and allowed uniform crop stand and growth, thus resulting in lesser weed infestations. Unleveled fields, on the other hand, frequently exhibited patchy growth due to higher weed load. The areas with sparse plant populations were zones of higher weed infestation because weeds were mostly C4 plants and possessed the inherent genetic capability to suppress crop growth. [3] and [2]reported the similar findings.

Table-1 *Number of weeds per m^2 in groundnut at 30 DAS as influenced by different land leveling and irrigation methods*

Treatments	Number of weeds per m^2		
	2013	2014	Pooled
Main treatments (L)			
L_1	26.08	28.46	27.27
L_2	22.00	27.17	24.58
L_3	33.33	38.04	35.69
L_4	42.42	47.00	44.71
S.Em.±	1.91	2.60	2.10
C.D. (P=0.05)	6.12	8.31	6.71
Sub treatments (I)			
I_1	32.15	33.08	32.61
I_2	29.77	37.25	33.51
S.Em.±	0.73	1.24	0.68
C.D. (P=0.05)	NS	NS	NS
Interaction (L X I)			
$L_1 I_1$	25.50	30.17	27.83
$L_1 I_2$	26.67	26.75	26.71
$L_2 I_1$	21.67	26.25	23.96
$L_2 I_2$	22.33	28.08	25.21
$L_3 I_1$	32.42	39.75	36.08
$L_3 I_2$	34.25	36.33	35.29
$L_4 I_1$	39.50	52.83	46.17
$L_4 I_2$	45.33	41.17	43.25
S.Em.±	1.45	2.47	1.35
C.D. (P=0.05)	NS	NS	NS

NS – Non- significant
L_1: Laser land levelling method with 0.2 per cent slope
L_2: Laser land levelling method with 0.4 per cent slope
L_3: Traditional land levelling method
L_4: No land levelling (control)
I_1: Border strip irrigation method
I_2: Check basin irrigation method

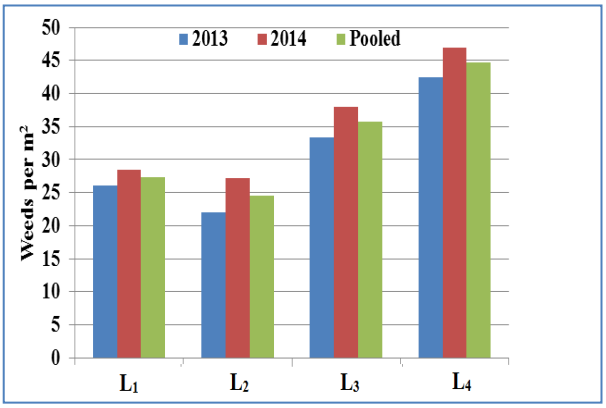

Fig-2 Number of weeds per m^2 in groundnut as influenced by different land levelling methods

Conclusions:

Laser land leveling techniques were observed to facilitate development of agricultural land scientifically to a desired grade leading to improved irrigation and moisture distribution which helped in reducing weed load as compared to traditional leveling and no leveling. Laser land levelling also enhanced groundnut performance and production as evidenced by higher pod yields.

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Conflict of Interest: None declared.

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