DOI: https://doi.org/10.52756/ijerr.2024.v44spl.008 *Int. J. Exp. Res. Rev.*, Vol. 44: 91-101 (2024)

Original Article | Peer Reviewed | Open Access

International Journal of Experimental Research and Review (IJERR)

ISSN: 2455-4855 (Online)
www.iaph.in

Dynamics of Weed and Productivity in Summer Green Gram (*Vigna radiata* L.) by Using Different Nitrogen Levels and Weed Control Techniques in South-Eastern Odisha

Koushik Sar[1], Arunabha Pal[2]*, Md. Riton Choudhury[1], Chunchu Suchith Kumar[3], Pilli Manasa[4], Subhashree Sarangi[1], Nayan Kishor Adhikary[5] and Priyanka Nandi[6]

[1]Department of Agronomy, FAS, Siksha 'O' Anusandhan, Bhubaneswar, Odisha, India; [2]Centurion University of Technology and Management, Odisha, India; [3]Department of Agronomy, School of Agriculture, SR University, Warangal, Telangana, 506371, India; [4]K.L. College of Agriculture, K. L. University, Andhra Pradesh, India; [5]School of Agricultural Sciences, Nagaland University, Nagaland, India; [6]Rabindra Nath Tagore Agriculture College, Birsa Agricultural University, Ranchi, Jharkhand, India

E-mail/Orcid Id:

KS, koushiksar1@gmail.com, https://orcid.org/0000-0002-7754-2663; *AP*, arunabha@cutm.ac.in, https://orcid.org/0000-0003-2654-0489; *MRC*, md.riton@gmail.com, https://orcid.org/0000-0001-7309-4886; *CSK*, iamsuchithkumar@gmail.com, https://orcid.org/0009-0004-4734-3796; *PM*, pmanasa@kluniversity.in, https://orcid.org/0000-0001-7727-4972; *SS*, subhasubhashree1999@gmail.com, https://orcid.org/0009-0002-0126-1221; *NKA*, nayan.bckv@gmail.com, https://orcid.org/0000-0003-4241-6090; *PN*, priyanka20bau@gmail.com, https://orcid.org/0009-0006-2347-6871

Article History:

Received: 14th May., 2024
Accepted: 18th Oct., 2024
Published: 30th Oct., 2024

Keywords:

Green gram, Weed flora, Seed yield, Herbicides, Pendimethalin, Imazethapyr

How to cite this Article:
Koushik Sar, Arunabha Pal, Md. Riton Choudhury, Chunchu Suchith Kumar, Pilli Manasa, Subhashree Sarangi, Nayan Kishor Adhikary and Priyanka Nandi (2024). Dynamics of Weed and Productivity in Summer Green Gram (*Vigna radiata* L.) by Using Different Nitrogen Levels and Weed Control Techniques in South-Eastern Odisha. *International Journal of Experimental Research and Review*, *44*, 91-101.
DOI: https://doi.org/10.52756/ijerr.2024.v44spl.008

Abstract: A field experiment was carried out at ARS, Faculty of Agricultural Sciences, SOADU, Bhubaneswar, on Dynamics of weed and productivity in summer Green Gram (Vigna Radiata L.) by using different nitrogen levels and weed control techniques in south-eastern Odisha during summer, 2022. The experiment was conducted in split plot design with three replications comprising fifteen treatment combinations. The main plot had three levels of nitrogen, and the sub-plots used five weed control methods. The most prevalent weeds in the experimental plots were *Poa annua, Digitaria sanguinalis, Echinochloa colona, Cleome viscose, Ageratum conyzoides, Portulaca oleracea* and *Melochia corchorifolia*. According to the result, dry weight and weed density obtained for each crop growth stage were lower under 75% nitrogen. Similarly, two-hand weeding at 15 and 30 days after sowing reduced dry weight and weed density to the lowest level that was on par with ready-mix of pendimethalin + imazethapyr @ 0.75 kg ha^{-1} pre-emergence control. Similar to 100 % N application and maximum growth in terms of all yield parameters was observed under 125% nitrogen. In terms of weed control, pre-emergence treatment of the ready-mix herbicide was closely followed by two-hand weeding at 15 and 30 days after sowing, which produced the maximum seed yield (930.56 kg ha^{-1}) and stover yield (2397.11 kg ha^{-1}) for green gram. In comparison to the plots receiving two hand weeding and a ready-mix herbicide treatment, the seed yield in the untreated weed plots was 51.70 and 50.88% lower, respectively.

Introduction

A contributing factor to the reduction in green gram yield is farmers' uneven fertilizer application, which degrades the soil and turns it unfertile and unfit for future cultivation (Biswas and Ghosh, 2016; Banerjee et al., 2021). Farmers normally use common chemical fertilizers because they are unaware of the nutrients and soil productivity their crops need. A proper fertilization management plan based on soil productivity evaluation can improve soil health (Dhakal et al., 2016; Majumder et al., 2020; Yohannes et al., 2024). Green gram is often referred to as a source of protein under food variation. As well as it can fix symbiotic nitrogen, which improves soil fertility and water use efficiency (Thakur et al., 2021). Legume cultivation has many benefits for the growing of plants and the environment. In addition, weed is one of

***Corresponding Author:** arunabha@cutm.ac.in

the main obstacles to the growth of green gram. Summer green gram often suffers from strong competition with weeds as it grows under irrigated conditions.

Weeds multiply quickly and are a major problem for agricultural fields, especially in the rainy season when they are more prevalent (Verma et al., 2017; Patnaik et al., 2022). Weeds have the ability to reduce crop yields by up to 45.6% during this crucial stage of crop-weed competition (Reddy et al., 2022; Algotar et al., 2015). Efficient weed control becomes essential to avoid significant decreases in yield. Since 70–80% of crop development happens in the first 20–40 days after planting, herbicides that work before weeds sprout are essential at this early period of crop growth. These pre-emergence herbicides aid in creating the ideal environment for crop growth by preventing weed growth (Duary et al., 2016).

During the critical growth period, it's very much necessary to employ techniques like post-emergence herbicides, hand weeding, or inter-cultivation to combat weeds. This integrated tactic ensures that each growth stage is adequately managed, thereby enhancing yield. Although hand weeding is a widely recognized secure and effective method, it is time-consuming, expensive, and challenging to implement rapidly over extensive areas. This is why chemical weed management is gaining popularity. In this research, the application of pre-and post-emergence herbicides and readily available ready-mix formulations to restrict the growth of annual grasses and broadleaved weeds, reducing competition between crops and weeds, is becoming more prevalent (Mohanty et al., 2023). The primary goal of the current research is to investigate the productivity and weed dynamics of summer green gram under various nitrogen levels and weed management methods.

Materials and Methods

Experimental period, location, design and treatment

The field experiment was conducted during 2022 in the summer season at the Agricultural Research Station in Binjhagiri, affiliated with the Faculty of Agricultural Sciences at SOADU, located in Odisha, India. The research site lies at an elevation above sea level 45 meters within the Agro-climatic Zone of Odisha East and South Eastern Coastal Plain. Geographically, the location is situated at latitude 20°26' N and longitude 85°67' E. The soil in the experimental area is characterized by a sandy loam texture, with a pH level of 5.4, indicating slight acidity. The organic carbon content in the soil is relatively low at 0.43%, which can affect soil fertility and crop growth. The soil's nutrient profile includes medium levels of available potassium at 143 kg per hectare, available phosphorus at 21 kg per hectare, and available nitrogen at 230 kg per hectare, providing a balanced nutrient base for the study.

Nitrogen was applied in three different levels like 75% of the recommended dose, 100% of the recommended dose, and 125% of the recommended dose, with these treatments assigned to the main plots. For weed management, five different practices were tested in the subplots, application of Pendimethalin at a rate of 0.75 kg per hectare one day after sowing (DAS), application of Imazethapyr at 75 grams per hectare twenty days after sowing, a combination of Pendimethalin at 0.75 kg per hectare with Imazethapyr applied one day after sowing, manual weeding performed twice at 15 & 30 days after sowing, and a control plot where no weed management was applied.

Sowing, fertilization practices, crop weed sampling process & statistical analysis

The green gram variety "Virat" was sown manually in rows at 30 kg per hectare seed rate, with row spacing set at 30cm x 10 cm. A hand-operated backpack sprayer equipped with a flat fan nozzle was used to apply the herbicides, capable of delivering 500 liters of water per hectare. Both fertilizer treatments & herbicide applications were done according to the specific parameters set for each treatment in the experiment. Weed counting were conducted 30, 45, and 60 days after sowing (DAS) within a designated 0.25 m² sampling area in each plot, using a 50 cm x 50 cm quadrat placed. After collecting weed samples, the weeds were dried in a hot air oven set at 72°C, and their dry weight was measured. A square root transformation was applied to ensure the data's normality. Additionally, various yield-contributing traits and overall yields were recorded. The collected data were analyzed using analysis of variance (ANOVA) under a split-plot design, with statistical significance assessed at the 5% level.

Results and Discussion

Effect on weed

Green gram was infested with nine weed species, of which 4 were grasses and 5 broadleaved. *Poa annua, Digitaria sanguinalis, Ageratum conyzoides* and *Echinochloa colona* among the grasses and *Cleome viscose, Aeschynomene* sp., *Grangea maderaspatana, Portulaca oleracea* and *Melochia corchorifolia* among the broadleaved weeds were predominant weeds in the experimental field in experimental field (Mohanty et al., 2023; Senthilkumar et al., 2019) has noted a similar weed flora in green gram.

DOI: https://doi.org/10.52756/ijerr.2024.v44spl.008

The findings showed that weed density and dry weight significantly changed due to varying nitrogen levels. Lowest density of grasses, broad level and total weeds were recorded at 75% N followed by 100% N and 125% N at 30 DAS (Table 1 and Figure 1). Similar trend followed at 45 and 60 DAS. The dry weight of the total weed was reduced by 35.86 and 26.30 % with the application of 75% N as compared to the application of 125% N and 100% N, respectively, at 45 DAS.

Application of 100 and 125% N was recorded at par value of the density & dry weight of grasses, broadleaved and total weeds at 30, 45 and 60 DAS. Higher density and biomass were recorded at fewer than 125% N, which might have been due to the fact that under these treatments higher nitrogen doses were applied as compared to other treatments, which had better impact on weeds growth, resulting in higher weed dry weight. According (Dash et al., 2016; Singh et al., 2017) higher nitrogen doses enhanced robust weed growth because weeds can absorb a disproportionately higher amount of nitrogen than crops and grow more quickly than crops.

The results indicate that amid the various weed control methods, the lowest densities and dry weights of grasses, broadleaved weeds, and total weeds at 30, 45 & 60 days after sowing were achieved through manual weeding conducted twice at 15 and 30 days after sowing. This was found to be as effective as the pre-emergence application of a pendimethalin & imazethapyr premix at the rate of 0.75 kg per hectare (Table 1 and Figure 2). Specifically, the densities of weeds, Broadleaved weeds, and total weeds at these stages were similarly reduced by either pendimethalin at 0.75 kg per hectare or imazethapyr at 75 grams per hectare. The use of the pendimethalin & imazethapyr premix at 0.75 kg per hectare significantly reduced overall weed density by 82.38%, 91.39%, and 63.29% at 30, 45, and 60 DAS, respectively, compared to the untreated control plot. Furthermore, the application of this treatment resulted in significant reductions in the dry weight of total weeds, showing decreases of 88.55%, 85.36%, and 86.60% at 30, 45 & 60 days after sowing compared to the untreated

Table 1. Total weed density and dry weight as influenced by different nitrogen levels and weed control practices in green gram.

Treatment	Weed density (No. m^{-2})			Weed dry weight (g/m^{-2})		
	30 DAS	45 DAS	60 DAS	30 DAS	45 DAS	60 DAS
Nitrogen levels						
75% N	4.66 (21.18)	5.61 (30.94)	3.99 (15.39)	3.67 (12.97)	4.65 (21.16)	3.98 (15.33)
100% N	5.13 (25.80)	6.25 (38.54)	4.53 (20.00)	4.17 (16.87)	5.40 (28.71)	4.92 (23.68)
125% N	5.43 (29.03)	6.49 (41.63)	4.74 (22.01)	4.34 (18.30)	5.79 (32.99)	5.23 (26.88)
S.Em (±)	0.13	0.15	0.11	0.08	0.12	0.08
CD(P= 0.05)	0.51	0.60	0.45	0.30	0.46	0.32
Weed management practices						
Pendimethalin 0.75 kg ha^{-1} at 1 DAS	4.82 (22.78)	6.08 (36.51)	4.31 (18.11)	3.60 (12.46)	5.05 (25.05)	5.05 (25.05)
Imazethapyr 75 g ha^{-1} at 20 DAS	4.94 (23.86)	5.97 (35.10)	4.28 (17.82)	3.53 (11.96)	5.97 (35.10)	5.97 (35.10)
Pendimethalin+ imazethapyr 0.75 kg ha^{-1} at 1 DAS	3.66 (12.91)	4.54 (20.14)	2.92 (8.05)	2.73 (6.97)	3.44 (11.35)	3.44 (11.35)
Two hand weeding at 15 and 30 DAS	3.35 (10.75)	4.39 (18.73)	2.59 (6.23)	2.60 (6.24)	3.11 (9.19)	3.11 (9.19)
Weedy check	8.59 (73.27)	9.60 (91.62)	7.99 (63.29)	7.83 (60.86)	8.83 (77.51)	8.83 (77.51)
SEm (±)	0.11	0.10	0.09	0.11	0.10	0.10
CD(P=0.05)	0.31	0.30	0.26	0.33	0.30	0.30

DOI: https://doi.org/10.52756/ijerr.2024.v44spl.008

weedy check plot. These findings align with previous studies (Patel et al., 2018; Mahapatro et al., 2021).

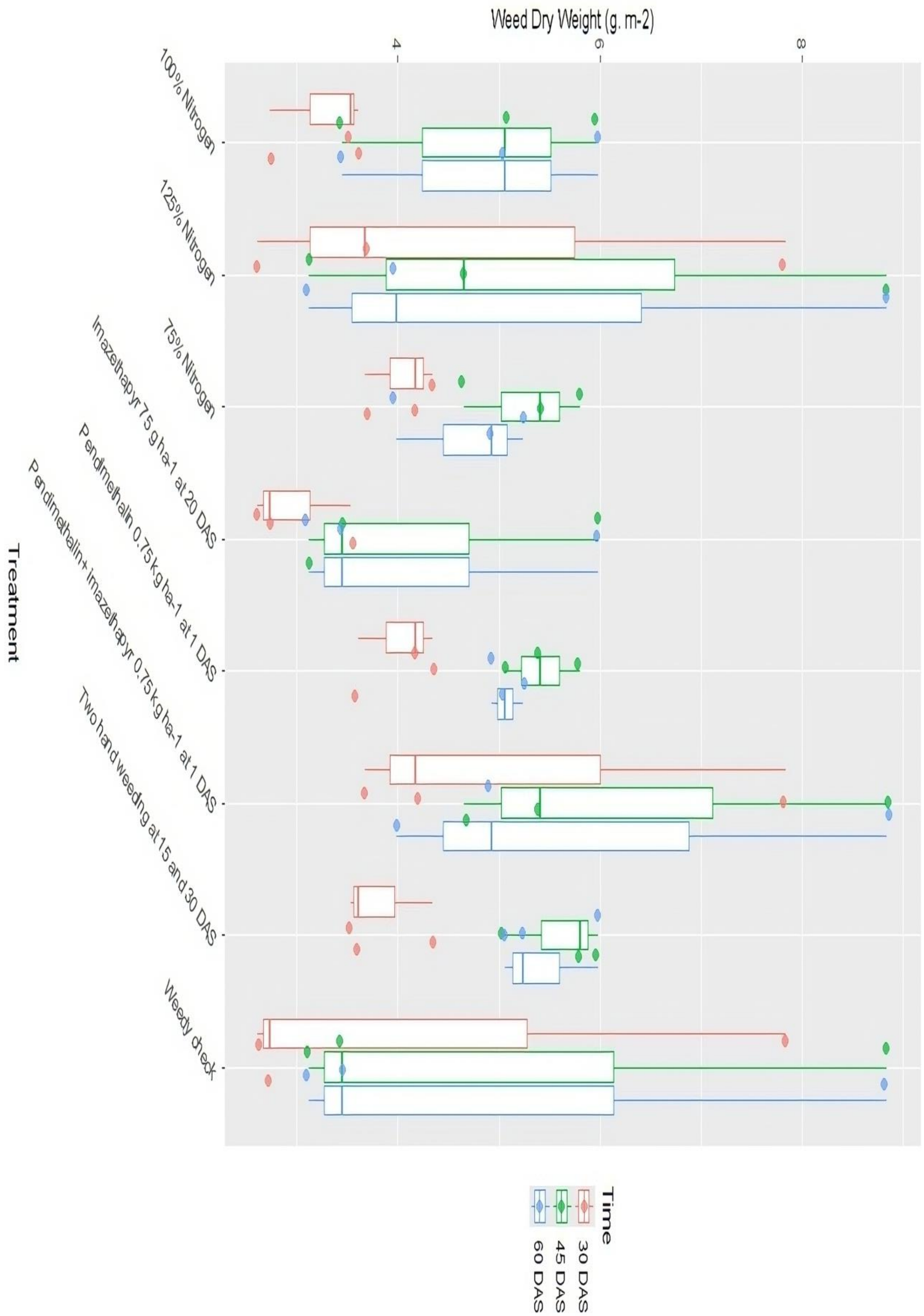

Figure 1. Effect of nitrogen levels & weeds management practices on weed density (No. / m^{-2}).

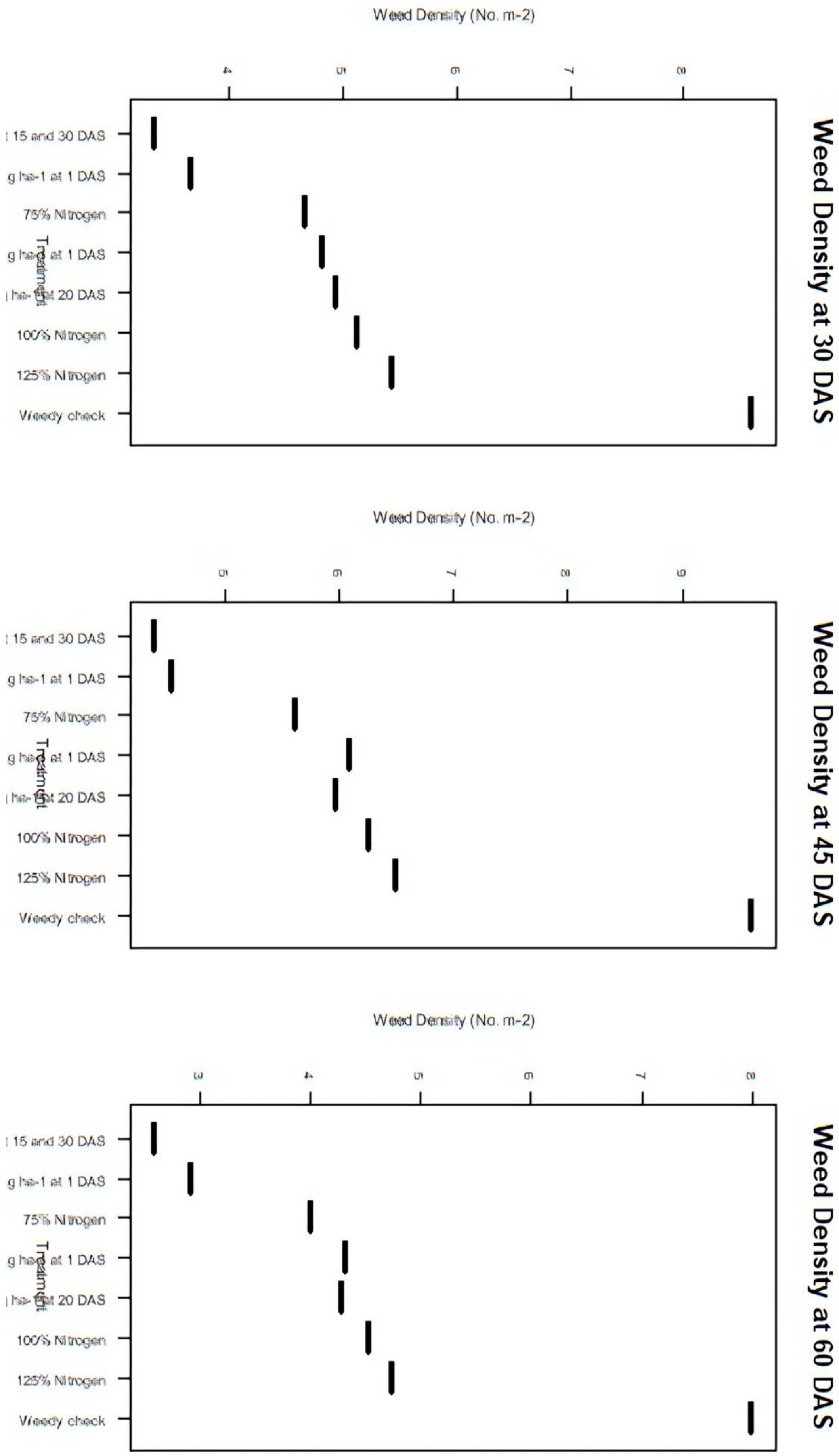

Figure 2. Effect of nitrogen levels & weeds management practices on weed dry weight (gm. /m^{-2})

DOI: https://doi.org/10.52756/ijerr.2024.v44spl.008

The consistent effectiveness of two hands weeding at 15 and 30 DAS was comparable to the pre-emergence application of a pendimethalin and imazethapyr premix at 0.75 kg per hectare, supporting similar conclusions drawn in earlier research (Singh et al., 2017). Both pendimethalin & imazethapyr demonstrated robust control over a wide variety of weed species throughout all stages of crop development, confirming their efficacy as reliable weed management options. Supporting this, earlier research (Kumar et al., 2014) demonstrated that a pre-emergence application of pendimethalin at 1.0 kg per hectare was effective in minimizing weed populations of monocots, dicots, and sedges at 25 and 50 DAS, as well as at the time of harvest. Additionally, the authors (Verma et al., 2014; Kamol et al., 2015) reported that post-emergence application of imazethapyr provided effective control of a broad spectrum of weed species in summer green gram, further highlighting the utility of these herbicides in comprehensive weed management strategies.

Effect on Green Gram

The application of nitrogen at 125% resulted in the maximum plant height, the greatest number of branches per plant, and the most substantial dry matter production at harvest. These outcomes were nearly identical to those achieved with a 100% nitrogen application, as shown in (Table 2 Figure 3). Weed management practices had a significant impact on the growth characteristics of green gram. Among the various treatments, two-hand weeding led to the tallest plants, the most branches per plant, and the highest dry matter production at harvest. These results were comparable to those obtained with the pre-emergence application of a pendimethalin & imazethapyr premix at 0.75 kg per hectare. Specifically, the use of the pendimethalin & imazethapyr premix before the emergence of weeds resulted in a notable improvement in the growth of the green gram. The number of branches per plant increased by 12.84% and 8.84%, and dry matter production at harvest increased by 12.81% and 17.20% when compared to the results from the individual applications of imazethapyr & pendimethalin, respectively. This demonstrates the premix treatment's superior effectiveness in enhancing green gram's overall growth and productivity. The similar result found by (Tamang et al., 2018; Teja et al., 2016).

These treatments' enhanced weed control effectiveness, which decreased weed biomass and density and eliminated crop-weed competition from the beginning to the end, is responsible for this improvement. As a consequence, there was an increase in the production of dry matter and the number of branches per plant, which is in line with findings from other research (Sreedevi et al., 2020; Pal et al., 2020; D et al., 2024). This also improved photosynthesis and allowed for

Table 2. Effect of nitrogen levels and weed control practices on growth and yield of green.

Treatment	Plant height (cm)	Branches/ plant	Dry matter production (g/m^2)	Seed yield (kg/ha)	Stover yield (kg/ha)
Nitrogen levels					
S1-75% N	36.6	6.7	240.21	632.03	1724.03
S2-100% N	40.6	7.7	298.21	826.83	2141.57
S3- 125% N	43.1	8.3	304.00	832.30	2189.64
SE(m)+	0.7	0.2	3.34	15.93	43.57
CD(P= 0.05)	2.9	0.6	13.12	62.56	171.06
Weed management practices					
T_1- Pendimethalin 0.75 kg ha^{-1} at 1 DAS	41.1	7.6	279.22	739.22	2042.56
T_2- Imazethapyr 75 g ha^{-1} at 20 DAS	42.1	7.9	290.07	784.44	2087.78
T_3-Pendimethalin+imazethapyr 0.75 kg ha^{-1} at 1 DAS	45.2	8.6	327.24	915.00	2315.33
T_4- Two hand weeding at 15 and 30 DAS	46.2	8.9	334.16	930.56	2397.11
T_5- Weedy check	25.9	4.8	173.33	449.39	1249.30
SEm (±)	0.8	0.2	4.63	16.53	44.50
CD(P=0.05)	2.3	0.6	13.50	48.25	129.90

DOI: https://doi.org/10.52756/ijerr.2024.v44spl.008

greater absorption of nutrients and water.

The maximum seed and stover yields were obtained with the application of 125% nitrogen, which was on par with the yield from 100% nitrogen application (Table 2 and Figure 3).

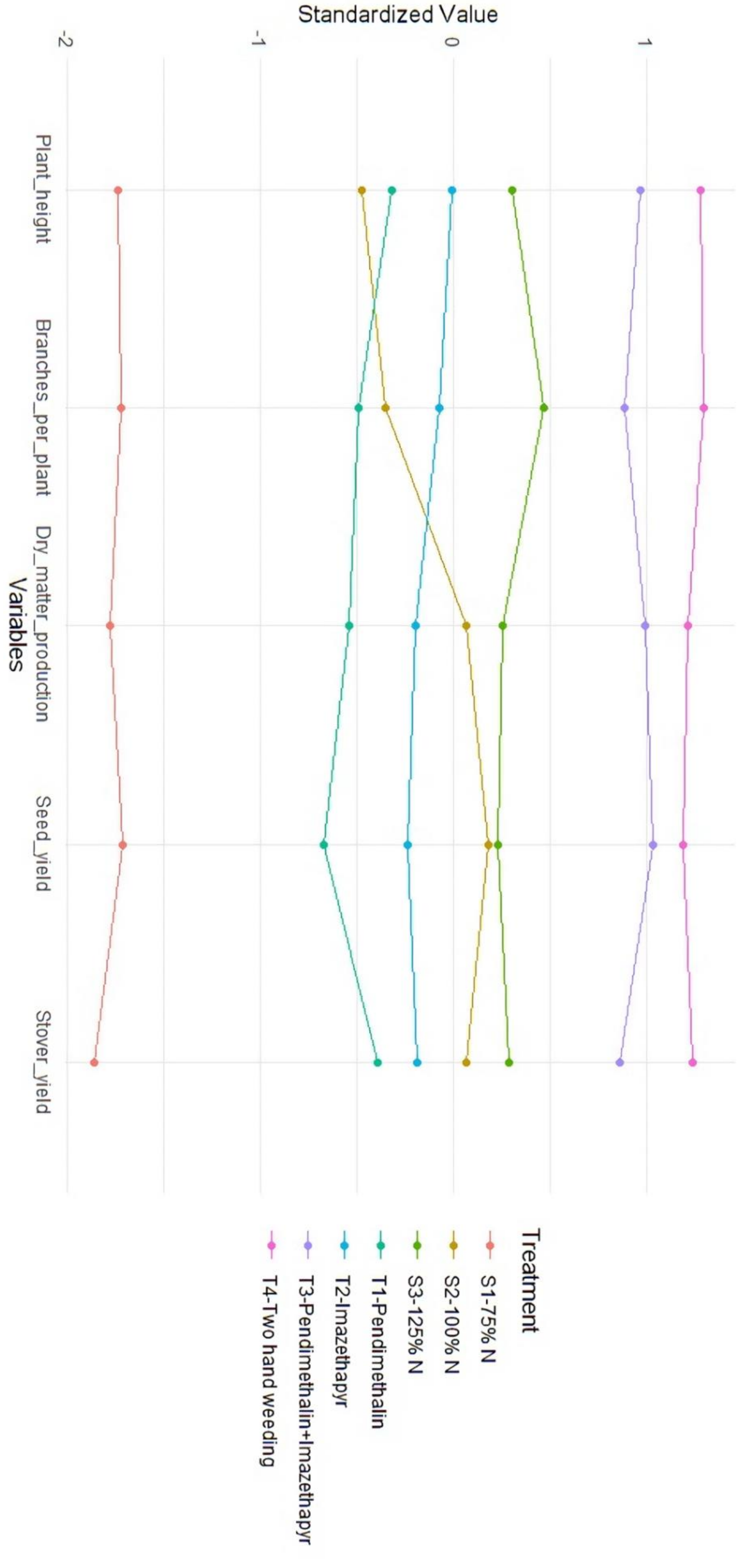

Figure 3. Effect of nitrogen levels & weed management practices on plant heights, branches/plant, dry matter production, seed & stover yield in parallel coordinates plot graph.

DOI: https://doi.org/10.52756/ijerr.2024.v44spl.008

The lowest yields were recorded with 75% nitrogen. Seed yield increased by 31.64% and 30.69% with 125% and 100% nitrogen, respectively, compared to 75% nitrogen. The improvement in yield likely resulted from an adequate supply of photosynthetic from the source to the sink due to sufficient nitrogen availability, which significantly enhanced growth and yield attributes. These findings closely align with those reported in other studies (Patel et al., 2013, Patel et al., 2018; Kumar et al., 2014).

In terms of weed management practices, the highest seed and stover yields were achieved with two hands weeding, which significantly outperformed other treatments. This was followed by the premix application of pendimethalin & imazethapyr at 0.75 kg ha^{-1}, then imazethapyr at 75 grams per hectare, and pendimethalin at 0.75 kg per hectare. Both the hand weedings conducted 15 and 30 days after sowing and the pre-emergence application of the pendimethalin & imazethapyr premix at 0.75 kg per hectare produced similar seed and stover yields. These results are consistent with findings reported in other studies (Mohanty et al., 2023). The pre-emergence application of the pendimethalin & imazethapyr premix led to a notable increase in seed yield—specifically, a 16.64% improvement compared to the post-emergence application of imazethapyr at 75 grams per hectare and a 23.78% increase over the pre-emergence application of pendimethalin at 0.75 kg per hectare alone (Table 2 and Figure 3). This highlights the effectiveness of the premix treatment in enhancing yield outcomes. The efficiency of these treatments in reducing weed biomass and density likely contributed to the higher seed yields, as they decreased competition for nutrients, water, light, and space, thereby enhancing sunlight utilization, photosynthesis, and resource partitioning towards seed formation.

The weedy check plots had the lowest seed and stover yields, 51.70% and 50.88% lower, respectively, than the plots treated with two manual weeding at 15 and 30 DAS and the ready-mix pendimethalin plus imazethapyr at 0.75 kg ha^{-1}. Conclusions from earlier study (Singh et al., 2017) are likely supported by the poor performance in the weedy check plots, which are attributed to greater weed density and weed dry weight. The interaction effect was significant, showing that the maximum seed and stover yields were obtained when 125% nitrogen was combined with two manual weeding. This was closely followed by

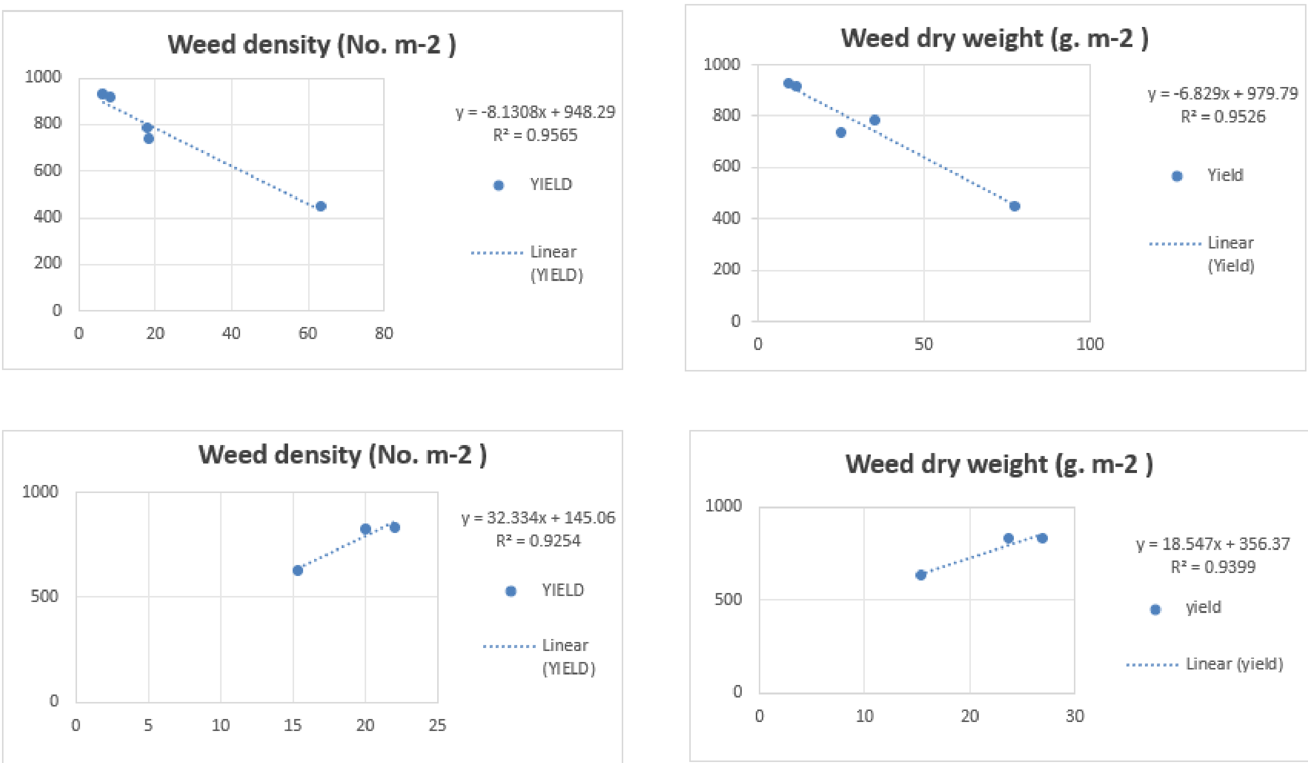

Figure 4. Relationship between
(a) Weed density and yield at different weed management practices.
(b) Weed dry weight and yield at different weed management practices.
(c) Weed density and yield at different nitrogen levels.
(d) Weed dry weight and yield at different nitrogen levels.

DOI: https://doi.org/10.52756/ijerr.2024.v44spl.008

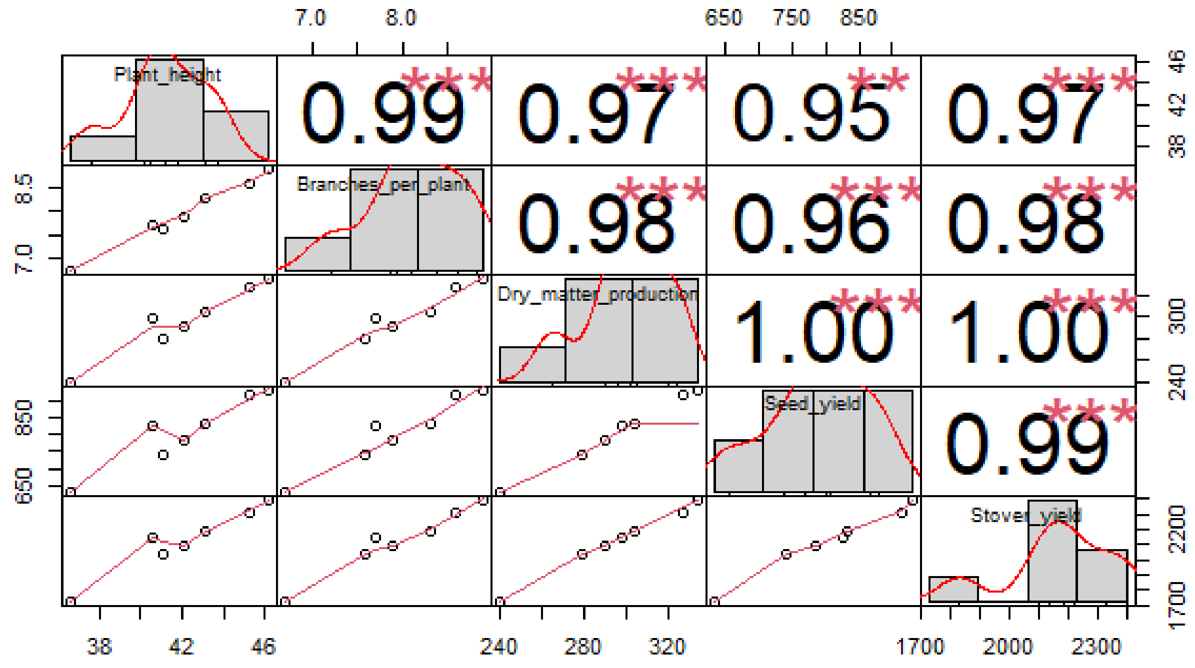

Figure 5. Scatterplot correlation between plant heights, branches/plant, dry matter production, seed & stover yield.

the combination of 125% nitrogen and the premix treatment of pendimethalin plus imazethapyr at 0.75 kg ha^{-1}. A similar result was found by (Maitra et al., 2020; Teja et al., 2017; Singh et al., 2012).

Correlation and Regression Analysis

Weed density and dry matter showed a highly significant negative correlation with the yield attributes and overall yield of green gram (Figure 4a, b, c, d and Figure 5). This suggests that as weed interference increased, the yield attributes and yield of the crop decreased proportionally. Conversely, as weed interference decreased, the yield attributes and yield improved. This relationship highlights the critical impact of effective weed management on optimizing green gram yield.

Conclusion

Thus, the ready-mix of pendimethalin + imazethapyr at 0.75 kg ha^{-1}effectively managed weeds and significantly enhanced the growth and productivity of summer green gram. This treatment successfully balanced weed control with the promotion of healthy crop development, leading to improved overall yields.

Acknowledgement

The authors acknowledge the FAS, Siksha ‘O’ Anusandhan, Bhubaneswar, Odisha, Centurion University of Technology and Management, Odisha, K. L. University, Andhra Pradesh, S.R. University, Warangal, Telangana, School of Agricultural Sciences, Nagaland University, Nagaland and Birsa Agricultural University, Jharkhand for providing all the facilities to carry out this study.

Conflict Interest

The author declares no conflict of interest.

References

Algotar, S.G., Raj, V.C., Patel, D.D., & Patel, D.K. (2015). Integrated weed management in green gram, Paper presented at 25th Asian-Pacific Weed Science Society Conference on “Weed Science for Sustainable Agriculture *“Environment and Biodiversity”*, Hyderabad, India. pp. 77

Banerjee, S., Mitra, S., Velhal, M., Desmukh, V., & Ghosh, B. (2021). Impact of agrochemicals on the environment and human health: The concerns and remedies. *Int. J. Exp. Res. Rev.*, *26*, 125-140. https://doi.org/10.52756/ijerr.2021.v26.010

Biswas, P., & Ghosh, R. (2016). Effective weed management practices to control complex weed flora in different cultivars of hybrid and high-yielding varieties of rice (*Oryza sativa* L.). *Int. J. Exp. Res. Rev.*, *2*, 14-19. https://doi.org/10.52756/ijerr.2016.v2.004

D.T., S., Hadole, M., & Maitra, S. (2024). Enhancing Capsicum Cultivation under Polyhouse, Shadenet House and Open Field Conditions with Drip Fertigation. *International Journal of Experimental Research and Review, 43*(Spl Vol), 190–200. https://doi.org/10.52756/ijerr.2024.v43spl.014

Dash, S., Teja. K.C., & Duary, B. (2016). Weed management in kharif black gram with imazethapyr and other herbicides In: National Seminar on "Recent Trends in Agriculture and Allied Sciences for Better Tomorrow", Visva-Bharati, West Bengal. Pp. 49.

Dhakal, K., Singh, K., Adhikari, S., Ojha, R., & Sapkota, M. (2016). Response of application of different sources of nutrients as fertilizer on growth and yield of Cauliflower (*Brassica oleracea* L. var. Botrytis) and its residual effect on soil. *Int. J. Exp. Res. Rev.*, *7*, 10-17.

Duary, B., Dash, S., & Teja, KC.(2016). Impact of tillage on seed bank, population dynamics and management of weeds. *SATSA Mukhapatra – Annu Techc Issue*, *20*, 104-12.

Komal, S.P., & Yadav, R.S.(2015). Effect of weed management on growth, yield and nutrient greengram, *Indian J. Weed Sci*., *47*(2), 206-210.

Madhu, N.R., Sarkar, B., Biswas, P., Patra, A., Biswas, S.J., & Behera, B.K. (2015). Plant extracts as potential for Anti-feeding activity of rodents and some important insects pest: An eco-friendly approach for pest control. *Int. J. Adv. Res. Biol. Sci.*, *2*(8), 170–175.

Mahapatro, S., Shankar, T., Maitra, S., Pal, A., Nanda, S.P., Ram, M.S., & Panda, S.K. (2021). Growth and productivity of maize (*Zea mays* L.) as influenced by nitrogen management options, *International Journal of Agriculture, Environment and Biotechnology*, *14*(2), 207-214. https://doi.org/10.30954/0974-1712.02.2021.14

Maitra, S., Shankar, T., Palai, J.B., Sairam, M.S., Pal, A., & Gaikwad, D.J. (2020). Cultivation of gerbera in playhouse. *Protected Cultivation and Smart Agriculture*, pp. 219-226. https://doi.org/10.30954/NDP-PCSA.2020.23

Majumder, D., Ray, M., & Khan, D. (2020). Effect of crop management and weed control systems on the native soil microbial population. *Int. J. Exp. Res. Rev.*, *21*, 1-9. https://doi.org/10.52756/ijerr.2020.v21.001

Mohanty, P., Sar, K., Duary, B., & Mishra, G. (2023). Effect of sole and ready-mix herbicides on weeds and productivity of summer green gram in Odisha. *Indian Journal of Weed Science, 55*(1), 50–53. http://dx.doi.org/10.5958/0974-8164.2023.00009.6

Pal, A., Adhikary, R., Bera, M., & De S.K. (2020). Pitcher irrigation in salinity management for production of brinjal crop in coastal soil of West Bengal, India, *Ecology, Environment and Conservation*, *26*, 179-183.

Pal, A., Adhikary, R., Bera, M., De, S.K., & Sardar, M. (2020). Application of Different Geotextile in Soil to Improve the Soil Health in Humid and Hot Sub Humid Region of West Bengal, India. *Int. J. Curr. Microbiol. App. Sci.*, *9*(6), 2812-2818. https://doi.org/10.20546/ijcmas.2020.906.340

Pal, A., Adhikary, R., De, S.K., & Sardae, M. (2020). Effect of different geotextile treatments in soil to increase the yield and yield attribute of capsicum (*Capsicum annuum*), *International Journal of Chemical Studies*, *8*(3), 2620-2622. https://doi.org/10.22271/chemi.2020.v8.i3al.9608

Patel, H.B., Patel, G.N., Patel, K.M., Patel, J.S., & Patel, N.H. (2013). Integrated weed management studies in mustard [*Brassica juncea* (L.) Czern and Coss.]. *AGRES An International e-Journal*, *2*(3), 276-282.

Patel, T.U., Lodaya, D.H., Italiya, A.P., Patel, D.D., & Patel, H.H. (2018). Bio efficacy of herbicides in direct-seeded rice. *Indian Journal of Weed Science*, *50*(2), 120-123. https://doi.org/10.5958/0974-8164.2018.00030.8

Patnaik, P.K., Dash, S., Chowdhury. M.R., Das, S.P., Sar, K., & Pradhan, S.R. (2022). Weed growth and productivity of summer green gram (*Vigna radiata* L.) under sole and sequential application of herbicides, *Research on Crops*, *23*(1), 70-75. https://doi.org/10.31830/2348-7542.2022.011.3

Reddy, D.P., Pal, A., & Reddy, M.D. (2022). Effect of nitrogen levels on yield of rice varieties during kharif in South Odisha. *Crop Research, 57*(3), 108-112. https://doi.org/10.31830/2454-1761.2022.015

Senthilkumar, D., Chinnusamy, C., Bharathi, C., & Lavanya, Y. (2019). Stale seed bed techniques as successful weed management practice, *Journal of Pharmacognosy and Phytochemistry*, *8*(2S), 120-23.

Singh, M.K., & Singh, A. (2012). Effect of stale seedbed method and weed management on growth and yield of irrigated direct seeded rice, *Indian J. Weed Sci.*, *44*(3), 176-80.

Singh, G., Kaur, H., Aggarwal, H., & Sharma, P. (2017). Efficacy of pre- and post-emergence herbicides for weed control in green gram. *Indian Journal of Weed Science, 49*(3), 252–255.

Sreedevi, B., Singh, A., Thakur, C., Kumar, M.P., Mehra, V., Mahenderkumar, R., & Srivastava, G.K. (2020). Weed Control by Single Post-emergence Combination Herbicide Florpyrauxifen Benzyl Plus Cyhalofop Butyl in Aerobic Rice, *Current Journal of Applied Science and Technology, 29*(3), 109-122. https://doi.org/10.9734/cjast/2020/v39i330522

Tamang, D., Nath, R., & Sengupta, K. (2018). Effect of herbicide application on weed management in green gram (*Vigna radiata* (L.) Wilczek). *Advances in Crop Science and Technology*, *3*, 163.

Teja, K.C., Duary, B., Mandal, S., Dash, S., Mallick, R.B., & Kumar, M.S. (2017). Chemical weed management in kharif blackgram under lateritic soil of West Bengal, India. *Ecol. Environ. Conserv.*, 23(10), 32-36.

Teja, K.C., Duary, B., Dash, S., Bhowmick, M.K, & Mallikarjun, M. (2016). Efficacy of imazethapyr and other herbicides on weed growth and yield of kharifblackgram. *International Journal of Agriculture, Environment and Biotechnology*, *9*(6), 967-71. https://doi.org/10.5958/2230-732X.2016.00123.620.

Thakur, D., Jha, A., Chattopadhyay, S., & Chakraborty, S. (2021). A review on opportunities and challenges of nitrogen removal from wastewater using microalgae. *Int. J. Exp. Res. Rev.*, *26*, 141-157. https://doi.org/10.52756/ijerr.2021.v26.011

Verma, S.K., Prasad, S.K., Singh, S.B., Singh, Y.V., Singh, R.P., & Bahadur, S. (2017). Influence of mulching and weed management practices on weeds and nutrient uptake in green gram (*Vigna rediata* L.) under eight year old custard apple plantation. *International Journal of Bio-resource and Stress Management*, *8*(2), 191-195. https://doi.org/10.23910/ijbsm/2017.8.2.1607a

Yohannes, Z., Yoseph, T., Kiflu, A., Ayalew, T., & Haile, A. (2024). Liquid bio-slurry enhances the productivity of N-fertilized maize under field conditions in Ethiopia. *International Journal of Experimental Research and Review*, *43*(Spl Vol), 13–31. https://doi.org/10.52756/ijerr.2024.v43spl.002

How to cite this Article:

Koushik Sar, Arunabha Pal, Md. Riton Choudhury, Chunchu Suchith Kumar, Pilli Manasa, Subhashree Sarangi, Nayan Kishor Adhikary and Priyanka Nandi (2024). Dynamics of Weed and Productivity in Summer Green Gram (*Vigna radiata* L.) by Using Different Nitrogen Levels and Weed Control Techniques in South-Eastern Odisha. *International Journal of Experimental Research and Review*, *44*, 91-101.

DOI : https://doi.org/10.52756/ijerr.2024.v44spl.008