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INFLUENCE OF MULCHING AND *Ghanjeevamrit* ON WEED GROWTH AND YIELD OF PIGEONPEA UNDER NATURAL FARMING

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ABSTRACT

A field investigation was carried out during *kharif*, 2025 at Assam Agricultural University, Jorhat. With 4 mulching levels viz. no mulch, mulching with rice straw @ 2.0 t/ha, live mulching with rice bean and live mulching with cowpea and 3 bio-inputs levels viz. *ghanjeevamrit* @ 1000, 2000 and 3000 kg/ha as basal, the experiment was laid out in factorial randomized block design with 3 replications. In all the treatments, *dravajeevamrit* was applied @ 200 L/ha thrice from 20 days after sowing (DAS) onwards at 20 days interval. A wide range of weed species were observed in the experimental site. Weed growth was retarded and pigeonpea productivity was improved due to mulching compared to no mulch treatment. Comparatively, mulching with rice straw @ 2.0 t/ha ensued greater reduction in weed growth. The same mulching practice improved the plant height, root length, nodules/plant, crop and relative growth rates, pod (10.46 q/ha) and seed (7.12 q/ha) yields of pigeonpea. Application of 3000 kg/ha of *ghanjeevamrit* along with *dravajeevamrit* @ 200 L/ha thrice from 20 DAS onwards at 20 days interval improved plant height, root length, nodules/plant, crop and relative growth rates, pod (10.82 q/ha) and seed (6.79 q/ha) yields of pigeonpea.

Key words: Pigeonpea, natural farming, rice straw mulch, live mulching, weed growth

Introduction

Pigeonpea was selected for the study under natural farming system of cultivation, a low-input farming system because of its role in upholding soil fertility through biological nitrogen fixation with deep extensive root system. However, the growth of the crop is not rapid leaving more space for weeds during the nascent period of the crop. The yield loss of pigeonpea due to weeds was noted upto 30-80% (Talnikar *et al.*, 2008). Under natural farming, none other than mulching (*acchadana*) is the only weed management practice. It is one of the pillars of natural farming where it acts as soil moisture conserver and weed growth retarder. In natural farming, assessment on the effect of different types of mulching such as live and dead mulch is one important part of the present study. As in natural farming, no external direct source of nutrients

is applied, legume live mulching along with bio-inputs which acts as microbial inoculants to the soil can be used as a source of nutrients in addition to acting as suppressor of weeds and conserver of soil moisture. Considering these points and to observe the effect of mulching and bio-input i.e. *ghanjeevamrit* on weeds and crop growth and productivity, this experiment was planned.

Materials and Methods

The field investigation was carried out during *kharif*, 2025 at Assam Agricultural University, Jorhat. The current study with 4 mulching levels viz. no mulch, mulching with rice straw @ 2.0 t/ha, live mulching with ricebean and live mulching with cowpea and 3 bio-inputs levels viz. *ghanjeevamrit* @ 1000, 2000 and 3000 kg/ha as basal was laid out in factorial randomized block design with 3 replications. *Dravajeevamrit* @ 200 L/ha was applied

Results exposed that mulching treatments insignificantly decreased density of grassy weeds at 30, 60 and 90 DAS along with sedge species of weeds' population and broad-leaved weeds' population at 30 and 60 DAS (Table 1). However, mulching treatments significantly decreased sedge and broad-leaved weed density at 90 DAS. Mulching with rice straw @ 2.0 t/ha counted the lowest weeds (sedge and broad-leaved) at 90 DAS and it was statistically at par with live mulching with cowpea. At 30 and 60 DAS no significant variation in grassy weeds' dry matter was observed due to mulching treatments (Table 2). However, treatment mulching with rice straw @ 2.0 t/ha recorded significantly lower dry matter of grassy weeds at 90 DAS compared to rest of the treatment. At 30, 60 and 90 DAS, different mulching treatment significantly influenced the dry matter of sedge species of weeds. The lowest was recorded under above mentioned treatment. This treatment was

[illegible]

competitive ability of the crop for moisture, nutrients and space, thereby suppressing weed growth (Kalita *et al.*, 2017; Tomar *et al.*, 2020 and Azimi *et al.*, 2023).

Bio-inputs treatments and its interaction with mulching did not significantly influence the density and dry matter of grassy, sedge species and broad-leaved weeds at all the stages of observations (Table 1 and 2).

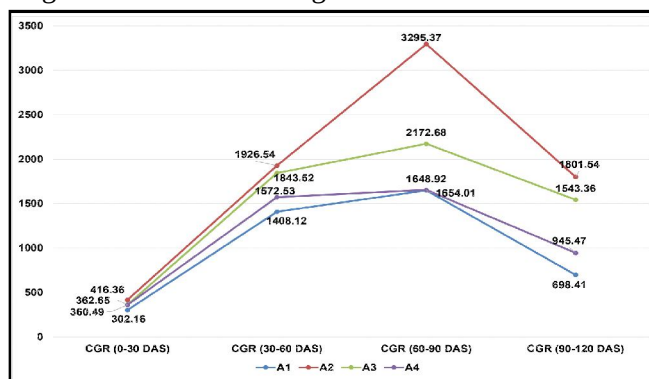
Mulching considerably improved plant height and root length at 60 and 90 DAS and nodules/plant at 60 DAS as compared to no mulching (Table 3). Mulching with rice

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Table 4: Pod and seed yields of pigeon pea as affected by treatments.

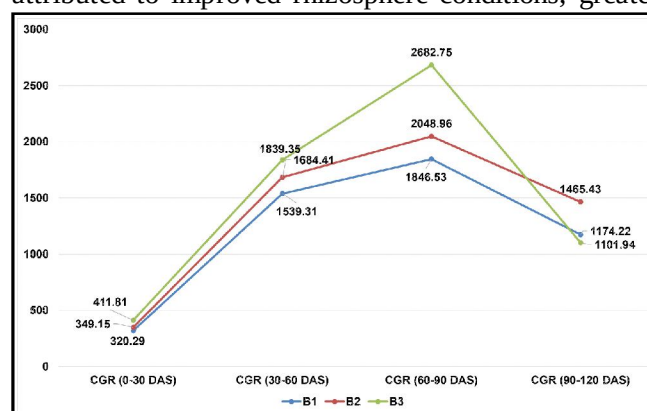
Treatments	Pod yield (q/ha)	Seed yield (q/ha)
Mulching		
Without mulch	7.72	5.20
Mulching with rice straw @ 2.0 t/ha	10.46	7.12
Live mulching with rice bean	9.00	5.85
Live mulching with cowpea	7.73	5.40
SE _m ±	0.50	0.25
CD (p=0.05)	1.48	0.72
Bio-inputs		
<i>Ghanjeevamrit</i> @ 1000 kg/ha	7.16	5.19
<i>Ghanjeevamrit</i> @ 2000 kg/ha	8.20	5.70
<i>Ghanjeevamrit</i> @ 3000 kg/ha	10.82	6.79
SE _m ±	0.44	0.21
CD (p=0.05)	1.28	0.62
Mulching × Bio-inputs		
SE _m ±	0.87	0.42
CD (p=0.05)	NS	NS

straw @ 2.0 t/ha lengthen the root (14.83 and 17.13 cm, respectively) more compared to rest treatments at 60 and 90 DAS, but was statistically equivalent with rice bean live mulching treatments at 90 DAS. The same treatment attained noticeably higher number of nodules/plant (14.67) at 60 DAS compared to others. Dukare *et al.*, (2017) also found similar results in cowpea due to mulching. Similarly, it recorded significantly taller plants with 32.82 and 47.52% over without mulch at 60 and 90 DAS, respectively. This treatment was found to be statistically at par with live mulching using rice bean at 60 DAS. Favourable rhizosphere environment in this treatment promoted better root growth in pigeon pea which is evident from the increment in root length by 11.84, 32.29 and 30.46% over without mulch in respective stages of observation. Organic mulches enhanced root

**Fig. 1:** CGR as affected by mulching treatments (A₁: Without mulch, A₂: Mulching with rice straw @ 2.0 t/ha, A₃: Live mulching with rice bean, A₄: Live mulching with cowpea).

growth compared to no mulch treatment due to improved soil moisture content that enhanced root proliferation (Saniga *et al.*, 2024) especially during active growth period of the concerned crop in absence of adequate rainfall. Choudhary and Kumar (2014) found increased root growth due to mulching. Mulching likely enhanced *Rhizobium* symbiosis by improving soil condition, root growth and thus improved root nodulation. Improved root development resulted in significantly greater plant height under rice straw mulching. Similar finding was recorded by Awal *et al.*, (2016). Live mulching treatment with cowpea and ricebean showed comparatively lesser crop growth than rice straw mulching, which was due to the vital and faster canopy coverage by the live mulch especially cowpea as observed during the experimentation in the very initial period of pigeonpea growth subjecting competition for resources of growth like space, nutrients, moisture etc.. Straw mulching reduced evaporation and thus conserved more moisture and nutrient from nascent stage of the main crop without any competition from mulching itself unlike live mulch treatments where expanded canopy coverage competed with the crop from the incipient growth stage of pigeon pea.

Different levels of *ghanjeevamrit* used in natural farming of pigeonpea significantly influenced plant height, root length and number of nodules/plant at 90 DAS than non-mulched (Table 3). Basal application of *ghanjeevamrit* @ 3000 kg/ha obtained the maximum root length and was statistically equivalent to the treatment with 2000 kg/ha of *ghanjeevamrit*. Application of *ghanjeevamrit* @ 3000 kg/ha increased root length by 25.23%, nodules/plant by 70.42% and plant height by 15.90% at 90 DAS over the lowest level. Gopal and Gurusiddappa (2022) also noticed significant increase in the root length of blackgram with higher concentration of *jeevamrit*. The enhanced root growth under it was attributed to improved rhizosphere conditions, greater

**Fig. 2:** CGR as affected by *ghanjeevamrit* levels {*ghanjeevamrit* @ 1000 kg/ha (B₁), 2000 kg/ha (B₂) and *ghanjeevamrit* @ 3000 kg/ha (B₃)}.

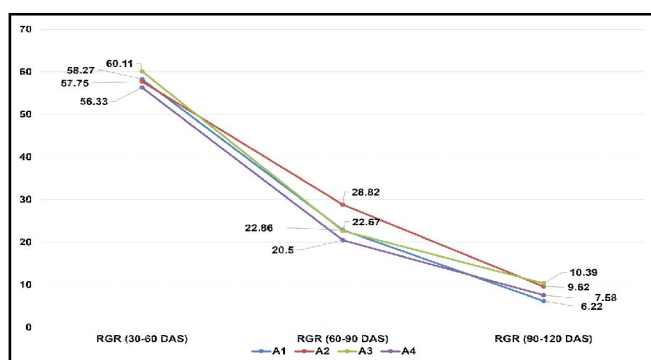


Fig. 3: RGR as affected by mulching treatments (A₁: Without mulch, A₂: Mulching with rice straw @ 2.0 t/ha, A₃: Live mulching with rice bean, A₄: Live mulching with cowpea).

nutrient availability, microbial activity and thus the supply of plant growth promoting substances such as IAA and GA resulting from the higher levels of *ghanjeevamrit* application, thereby facilitating root elongation and proliferation and consequently taller plants. Alike findings were reported by Panchal *et al.*, (2017) and Chongre *et al.*, (2020).

Crop growth rate (CGR)

In case of mulching, mulching with rice straw recorded the highest CGR during 0-30, 30-60, 60-90 and 90-120 DAS (Fig. 1). In case bio-input treatments, application of 3000 kg/ha *ghanjeevamrit* recorded the highest CGR during 0-30, 30-60 and 60-90 DAS (Fig. 2). This was due to the increase in dry matter accumulation owing to mulching and higher dose of *ghanjeevamrit* which resulted in higher crop growth rate. It was found that CGR increased progressively up to 60-90 DAS and declined thereafter during 90-120 DAS, indicating maximum dry matter accumulation during the active vegetative and reproductive phases followed by reduction in addition of dry matter at maturity.

Relative Growth Rate (RGR)

Mulching with rice straw @ 2.0 t/ha and application of 3000 kg/ha *ghanjeevamrit* recorded the highest RGR

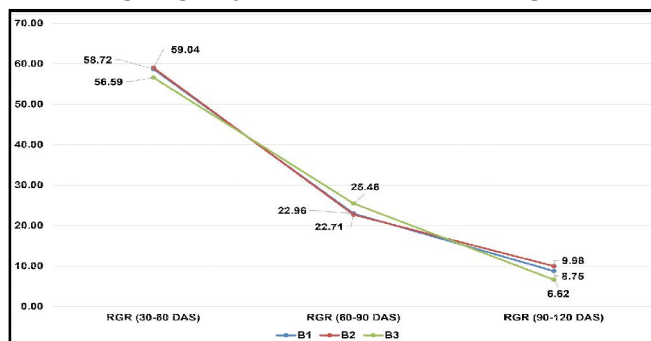


Fig. 4: RGR as affected by *ghanjeevamrit* levels {*ghanjeevamrit* @ 1000 kg/ha (B₁), 2000 kg/ha (B₂) and *ghanjeevamrit* @ 3000 kg/ha (B₃)}.

during 60-90 DAS among the levels of respective factors. The dry matter accumulation at 60 DAS was relatively higher than the existing dry matter at 30 DAS as the crop was in its active vegetative growth stage. In this research, flower initiation in pigeon pea was observed around 60-70 DAS followed by pod development at around 80-90 DAS and thereafter pod filling. During RGR calculation period 60-90 DAS, crop entered flowering and pod development phase, where photosynthates partitioned to sinks and dry matter accumulation rate was lowered as compared to 30-60 DAS. During 90-120 DAS, RGR became the lowest because the crop was in between pod filling and maturity stage, when dry matter partitioning to sink was more rather than new vegetative growth (Fig. 3 and 4).

Pod and seed yield

Rice straw @ 2.0 t/ha augmented pod and seed yields by 35.49 and 36.92%, respectively over without mulch which was due to improved above and below ground growth of the crop which helped better utilization of resources of growth in reduced crop-weed competitive environment (Table 4). The percentage increase in pod and seed yields due to *ghanjeevamrit* application @ 3000 kg/ha DAS onwards at 20 days interval was 51.12 and 30.83%, respectively over the lowest level due to better crop growth under the same.

Conclusion

In case of mulching practices, rice straw mulch @ 2.0 t/ha and in case of bio-inputs as basal application, *ghanjeevamrit* @ 3000 kg/ha along with *dravajeevamrit* @ 200 L/ha thrice from 20 DAS onwards at 20 days interval improved root length, nodules/plant, plant height, growth rates, pod and seed yields of the crop with minimum weed growth.

References

- Awal, M.A., Dhar P.C. and Sultan M.S. (2016). Effect of mulching on microclimatic manipulation, weed suppression, and growth and yield of pea (*Pisum sativum* L.). *Journal of Agriculture and Ecology Research International*, **8**(2), 1-2.
- Azimi, S., Amini R. and Hosseingolizadeh M. (2023). Suppression of weed and insect populations by living and straw mulches in sesame (*Sesamum indicum* L.). *Scientific Reports*, **13**(1), 21586.
- Bordoloi, R. (2026). Influence of mulching and bio-inputs of natural farming on pigeonpea [*Cajanus cajan* (L.) Millsp.]. [M.Sc. Dissertation, Department of Agronomy, Assam Agricultural University, Jorhat-785013, Assam, India].
- Chongre, S., Mondal R., Biswas S., Munshi A., Mondal R. and Pramanick M. (2020). Effect of liquid manure on growth

- and yield of summer green gram (*Vigna radiata* L. Wilczek). *Current Journal of Applied Science and Technology*, **38(6)**, 1-7.
- Choudhary, V.K. and Kumar P.S. (2014). Influence of mulching on productivity, root growth and weed dynamics of maize (*Zea mays*)–based cropping systems. *Indian Journal of Agronomy*, **59(3)**, 364-370.
- Dukare, A., Kale S., Kannaujia P., Indore N., Mahawar M.K., Singh R.K. and Gupta R.K. (2017). Root development and nodulation in cowpea as affected by application of organic and different types of inorganic/plastic mulches. *International Journal of Current Microbiology and Applied Sciences*, **6(11)**, 1728-1738.
- Kalita, S., Mundra S.L., Solanki N.S. and Sharma N.K. (2017). Weed management and nitrogen application for improved yield of mustard. *Indian Journal of Weed Science*, **4(1)**, 85-87.
- Gopal, V. and Gurusiddappa L.H. (2022). Influence of *jeevamrutha* (fermented liquid manure) on growth and yield parameters of tomato (*Solanum lycopersicum* L.). *World Journal of Environmental Biosciences*, **11(3)**, 1-7.
- Panchal, P., Patel P.H., Patel A.G. and Desai A. (2017). Effect of *panchgavya* on growth, yield and economics of chickpea (*Cicer arietinum*). *International Journal of Chemical Studies*, **5(2)**, 265-267.
- Saniga, N.S., Rani T.S. and Jose P.M. (2024). Influence of micro irrigation and mulching on the growth attributes, root morphology and nutrient uptake of tomato in rain shelter. *Plant Archives*, **24(2)**, 299-306.
- Talnikar, A.S., Kadam G.L., Karande D.R. and Jogdand P.B. (2008). Integrated weed management in pigeonpea. *International Journal of Agricultural Sciences*, **4(1)**, 363-370.
- Tomar, S., Beniwal D., Rajiv R., Sourabh S. and Kumar P. (2020). Effect of time of planting and mulching on weed intensity in the tomato (*Solanum lycopersicum*) crop. *Indian Journal of Agricultural Sciences*, **90(10)**, 1921–4.