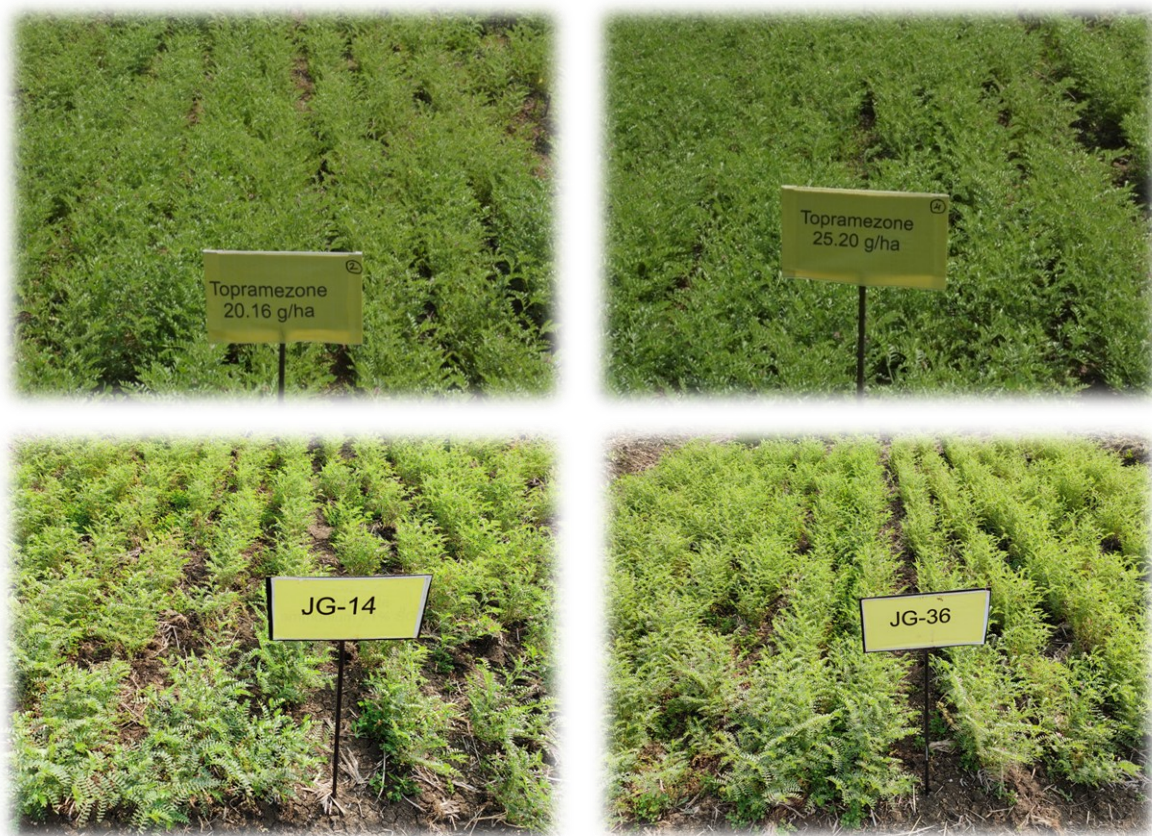


Topramezone: A selective post-emergence herbicide for efficient weed control in chickpea



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Prologue/Introduction

Chickpea (*Cicer arietinum* L.) is rich in protein (20-22%), dietary fiber, and micronutrients like iron and zinc. It is the second most important pulse crop globally and the largest in India, comprising 70-75% of the global population. It fixes atmospheric nitrogen and improves soil fertility, making it suitable for low-input, rainfed farming and dryland agriculture. Due to its short duration, it aids in cropping system intensification. Despite several advantages, it is known to be a poor competitor against weeds, resulting in up to 20-75% yield loss within the first 30-45 days after sowing (DAS). Its slow early growth makes it highly vulnerable to weed competition. Timely weed control increases yield and input-use efficiency. However, no post-emergence herbicide is available to control broadleaf weeds. Therefore, a technology for broad-spectrum weed control is necessary. Thus, there is an urgent need for studies to evaluate promising pre-emergence (PE) and post-emergence (PoE) herbicides, optimize the economic dose of effective herbicides, standardize the application timing, and conduct varietal evaluations against promising herbicides for effective weed control, higher seed yield, and profitable chickpea production.

Methodology

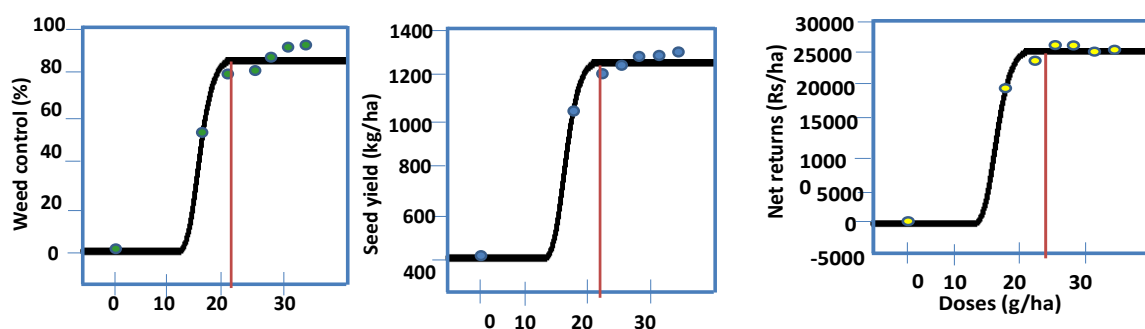
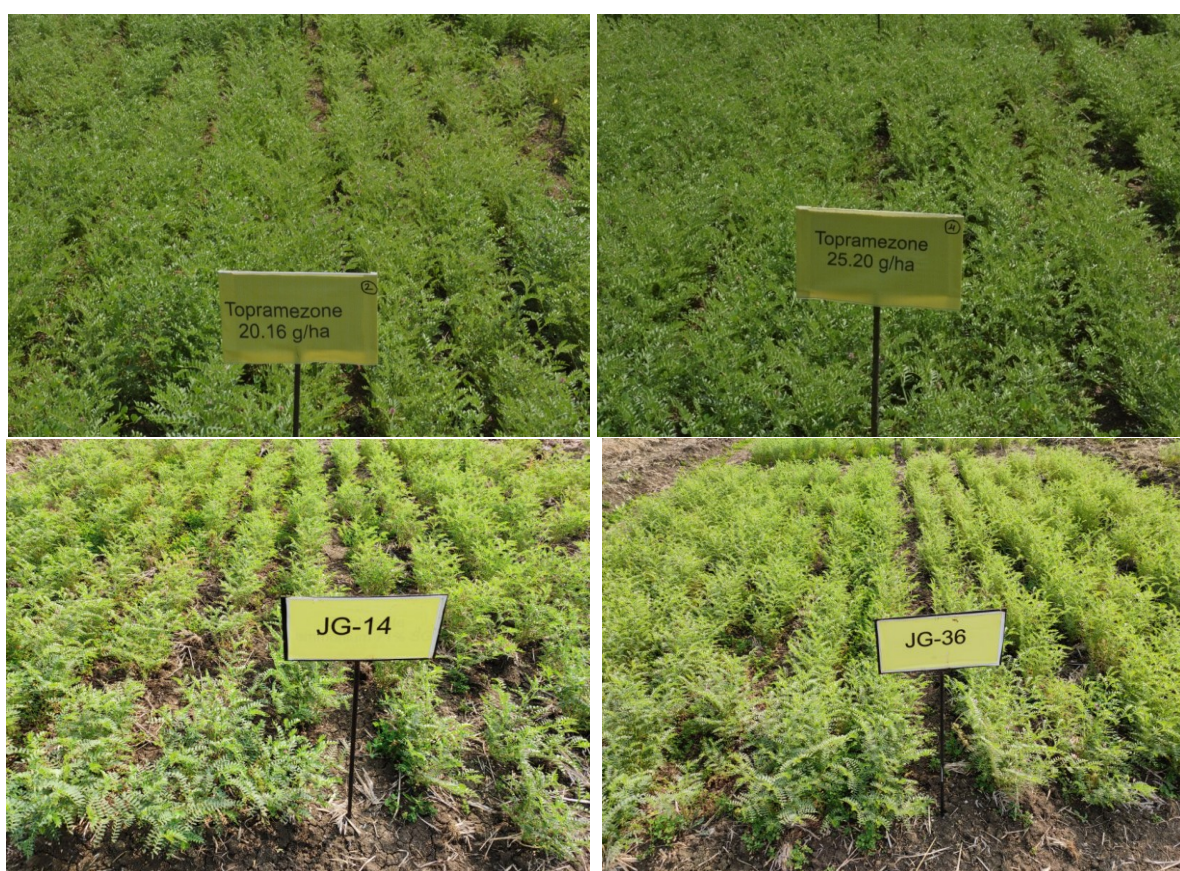
- Study was initiated with screening of three pre-emergence herbicides (pendimethalin 38.7% CS 678 g/ha, flurochloridon 625 g/ha and pendimethalin+imazethapyr 1.00 kg/ha) and five post-emergence herbicides (imazethapyr 50 g/ha, propaquizofop+imazethapyr at 62.5 and 125 g/ha, Na-acifluorfen+clodinafop 122.5 and 245 g/ha, imazethapyr+imazamox 70 g/ha, topramezone 20 and 30 g/ha) in JG 130 variety of chickpea.
- Further, staggered dose of topramezone (0, 17.64, 20.16, 22.68, 25.2, 27.72 and 30.24 g/ha) was evaluated in JG-130 variety of chickpea.
- Topramezone at 20.16 g/ha was evaluated in ten promising chickpea varieties (JG-315, JG-322, JG-11, JG-16, JG-63, JG-14, Jaki 9218, JG-12, JG-36 and JG-36) recommended for the central India with tow application timing (20 and 30 days after sowing). All the experiments were repeated and conducted in replicated trials.

Results

The results of the study indicated that pendimethalin+imazethapyr 1.00 kg/ha was an effective pre-emergence herbicide. Among the PoE herbicides, topramezone (a HPPD inhibitor) at 20 and 30 g/ha was equally effective compared to others, albeit with mild and recoverable phytotoxicity. Furthermore, a dose-response study confirmed that topramezone at 20.16 g/ha provided effective weed control, higher seed yield, and was economically viable. Additionally, the application at 20 days after sowing was more effective than later applications. Among the tested chickpea cultivars, JG-14, 16, and 36 exhibited less phytotoxic to the topramezone and higher yield. Therefore, topramezone 20.16 g/ha at 20 days after sowing in JG-14 varieties emerges as a potential option for broadleaf weed control in chickpea cultivation, offering effective weed control, and higher seed yield while minimizing harm to the crop.

Benefits

- Productivity gain: Topramezone at 20.16 g/ha was effective which provided 23.6% more seed yield than pendimethalin 678 g/ha.
- Saving of labour: Topramezone 20.16 g/ha can save 27 man-days/ha with enhanced efficiency over one hand weeding.
- Efficiency: Application of topramezone at 20.16 g/ha onwards provided > 80% weed control (especially broadleaved weeds). Topramezone applied at 20 days after sowing provided 71.3% more weed control than late application. This has no phytotoxic effect on subsequent greengram.
- Cost effectiveness including benefit cost ratio: The technology costs only Rs 4000/ha and saves Rs. 8000/ha over one hand weeding. The B: C was 2.5.



Dose response of topramezone on weed control (%), Seed yield (kg/ha) and net returns (Rs/ha)

Upscaling

This is novel HPPD inhibitor herbicide which has no label claim for chickpea. Therefore, efforts may be taken to get the label claim as soon as possible. Further, the demonstration and awareness through field level demonstrations, farmers field school, and digital tools and exhibition of technology to larger chickpea growers will certainly upscale its adoption.

Acknowledgement

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