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Wheat (*Triticum aestivum* L.) being a major cereal crop has been cultivated in India and belong to family Poaceae. It is world’s most widely cultivated food crop after rice and it is utilized in various forms by more than billion people in the world. India is firmly occupying the second position among the wheat producing countries in the world after China. In India, it occupies an area of 26.30 m ha having production of 72.00 mt and productivity of 2.73 t ha\(^{-1}\), which contributes about 34 per cent of total food grain production of the country (Anonymous 2006). Uttar Pradesh ranks first with respect to area (9.16 m ha) and production (24.53 mt), but the productivity (2.72 t ha\(^{-1}\)) is comparatively less than Punjab and Haryana (Anonymous, 2006).

The domestic demand for wheat by 2020 is projected to be 103 mt. As the wheat area is mostly oscillating between 24-27 mha in the last fifteen years, there is very little scope for expansion of area in the future. Thus, plan for vertical increase in yield per hectare is urgently required to ensure household food security and to promote wheat based food processing industries. There is a high concern for future in production of this commodity and thereby a need to analyze various factors which would help to enhance the production. Among the different reasons for low productivity of wheat, inadequate weed
India has reached the physical limit to the extension of area under wheat crop. The increase in production and productivity of wheat will come largely through appropriate crop and weed management. The introduction of high yielding dwarf varieties which comparatively require larger amount of water and fertilizers, has created conducive condition for luxuriant growth of weeds with high density. The prominent weed flora found in wheat crop comprises *Chenopodium album, Melilotus indica, Anagallis arvensis* (Bikramaditya *et al.*, 2000).

Significant reduction in yield of wheat due to severe infestation of weeds ranging from 18-73 percent have been reported by Dixit and Bhan (1997), 25,51 and 55 percent in tall, semi-dwarf and dwarf wheat, respectively by Sandhu *et al.* (1981) and 30 to 50 percent by Malik *et al.*, (1987). Thus, weed management is one of the significant inputs in this situation.

Many methods of weed control are being practiced but no one is absolute. The manual weeding besides expensive and painstaking cannot be practiced until weeds put forth sufficient vegetative growth. Therefore, we have to look foreword towards the other methods of weed control in this crop. Introduction of herbicides has made it possible to control a wide spectrum of weeds in wheat effectively.

Herbicides like pendimethalin @ 1.0 to 1.5 kg ha⁻¹ as pre-em or isoproturon @ 1.25 kg ha⁻¹ as post-em has been reported effective to control divergent weed flora in wheat crop (Thakur and Singh 1989, Singh and Malik, 1993 and Panda *et al.*, 1996). But, at present no
detrimental to the environment. In addition, selectivity of herbicides may lead to serious infestations of more noxious weed formerly of secondary importance. It has also been reported by the weed scientists from Hissar and Ludhiana that *Phalaris minor*, a problematic weed of wheat, is becoming resistant to isoproturon. Wheat is considered to detoxify the effect of isoproturon by cytochrome P_{150} mono-oxygenase enzyme (Cabanne *et al.*, 1987). Due to continuous use of herbicide (isoproturon) against *Phalaris minor* lead to higher activity of this degrading enzyme as the metabolites formed in wheat and *Phalaris minor* found to be similar. To alleviate this situation a logical combination of several weeding followed by manual, mechanical or with agronomic manipulations could provide perfection in weed management without marked loss in yield and environmental pollution (Sankarn, 1990).

In recent past, non-chemical approaches are gaining importance in the management of weeds due to inherent problems associated with chemical herbicides. Selection of competitive crop cultivars, closer row spacing, higher crop seed rate and bi-directional planting are some of the components in the integrated weed management which have been found to affect magnitude of weed control (Yaduraju and Ahuja, 1997).

Optimum plant population being one of the important factors in wheat could be maintained by optimum seed rate. Sowing of wheat at
the rate of 150kg seed ha\(^{-1}\) significantly reduced the *Phalaris minor* dry weight and total biomass of *Phalaris minor* over recommended rate of 100 Kg seed ha\(^{-1}\) (Yaduraju and Ahuja, 1997). Similarly, adoption of proper sowing method can also substantially to reduce the weed density and increase the productivity of wheat. Closer row spacing and bi-directional sowing are some of the other agronomic manipulations aimed at exerting pressure on weeds to reduce the cost of weed control or to lower the amount of herbicide used (Panwar *et al.*, 1989; Jabhao and Nalamwar, 1993). Sowing methods viz. broadcast, normal line sowing, double line sowing and criss-cross sowing though did not differ amongst themselves but were significantly superior to broadcast sowing, recording the maximum wheat grain yield (Singh *et al.*, 1987). Closer row spacing of 15 cm recorded lower weed count and weed dry weight than normal row spacing of 20 cm (Thakur *et al.*, 1997).

By manipulating plant geometry and plant density through varying row spacing and seeds rates along with the weed management practices, the weed control efficiency of herbicides can be increased appreciably (Johri and Singh, 1991). The information on the effect of integration of herbicide, seed rate and method of sowing on weed dynamics and yield of wheat is inadequate and fragmentary. Hence, keeping above points of weed management in normal sown wheat in view, the present experiment entitled "Integrated weed management in wheat was carried out at Research Farm of Bramhanand P. G. College Rath,"

1. To study the effect of method of sowing seed, rate and weed management practices on crop and associated weeds.

2. To find out the interaction effect of methods of sowing, seed rate and weed management practices on crop and associated weeds.

3. To workout the economics of different treatments.