



MIXED CROPPING SYSTEM

(WHEAT + MUSTARD) FOR MAXIMIZING
PRODUCTION UNDER RAINFED CONDITION



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FOREWORD



Wheat is a principal *rabi* crop of north-west sub-mountain region of India, grown either alone or mixed with mustard. Farmers generally broadcast mustard in the same field after sowing of wheat. Practice suffers from non-optimised moisture use and competition between different root systems of the crops grown in a mixture which reduces the productivity of the system. It also makes the cultural operations labour intensive which increases the cost of cultivation and results into low profit from the system. Thus, it is of vital importance to follow the efficient cropping practices so that both crops could be non-competitive to each other. For achieving this, crops must be grown in lines in a definite ratio for getting the maximum productivity and net profit.

Research conducted at CSWCRTI, Research Farm, Selakui (Dehradun) has been presented in this brochure to make the farmers aware about the benefits of the wheat + mustard mixed cropping (row ratio 9:1) technology developed at this institute for cereal + oil seed mixed cropping system. Its dissemination will be quite beneficial in enhancing productivity in the western Himalayan region.



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INTRODUCTION

- Wheat is generally grown either alone or mixed with mustard in maize based cropping system.
- The present practice of growing wheat + mustard crop mixture consists of broadcasting mustard seed after sowing of wheat in the field, followed by planting.
- The practice results in irrational and non-optimized use of soil moisture due to undesirable competition between wheat and mustard crop.
- To overcome this, the recommended practice of line sowing of both the crops and maintaining row ratio of 9:1 for wheat and mustard, respectively, has given encouraging results.

Why Wheat + Mustard In Rows with Ratio of 9:1?

- Recommended practice ensures optimum use of space and soil moisture.
- Results in better tillering for wheat and profuse branching and growth for mustard leading to better performance of crops and higher returns to the farmers.

METHODOLOGY

Crop Varieties

- Wheat varieties, viz; VL-616, VL-738, VL-829, HS-295, HS-240 are suitable for this region.
- Mustard varieties, Rohini, Kranti, Krishna, Varuna, Local Selection are suitable for sub-mountain region.

Field Preparation and Sowing

- One to two ploughings with soil turning plough followed by planking soon after harvest of *kharif* crop. This will conserve soil moisture.
- One light cultivation and levelling is required before sowing of wheat.

Manure and Fertiliser Application

- A recommended dose of 80 kg N, 40 kg P₂O₅ and 20 kg K₂O per hectare should be applied.
- Full dose of P and K, and half of N are given as basal application at sowing and the remaining N should be applied in January/February with first rain when there is a sufficient moisture in the soil.
- FYM @ 5 t/ha to be applied a month before sowing in the field.

Sowing

- Crops should be sown in time between mid October to mid November.
- Seed of wheat and mustard should be sown in lines (9:1) spaced 23 cm apart.
- For getting optimum plant population of wheat and mustard, 80 kg seed of wheat and 1.5 kg seed of mustard is sufficient for one hectare area.

Weed Control and Inter-cultural Operations

- Weeds can be controlled by spraying Pendimethalin @ 3.3 kg/ha immediately after sowing of wheat. Weed can also be controlled manually.

Crop Protection

- Seed should be treated with Captan or Thiram @ 2.5 g/kg before sowing to control fungal diseases. For rodent control, fumigate burrows of rat with aluminium phosphide tablets.

Harvesting and Threshing

- Both crops mature during the month of March and April. Mustard matures earlier than wheat.

CROP PRODUCTIVITY AND ECONOMICS

- Crop productivity calculated in term of wheat equivalent yield is given in the Table 1. Wheat+mustard (9:1) system is more productive as it yields 3570 kg/ha of wheat equivalent yield in comparison to 3139 kg/ha from pure wheat and 2667 kg/ha from farmer's method.
- Higher net return/ha of ₹ 18,065 was obtained by adopting wheat + mustard (9:1) mixed cropping technology (Photo 1) as compared to ₹ 13,890 from pure wheat and ₹ 13,871 with farmer's method.

Table 1: Wheat equivalent yield and net return from wheat+mustard (9:1) cropping system

Agronomical practices	Wheat equivalent yield (kg/ha)	Gross return (₹)	Net return* (₹)
Wheat+mustard (9:1)	3570	43,223	18,065
Farmer's method (Broadcasting)	2667	33,871	13,871
Pure wheat	3139	38,890	13,890

*Economics worked out considering the prices of 2010.

Other Benefits

- Wheat and mustard sown in ratio of 9:1 overcomes the disadvantage of unhealthy competition between cereal and oilseed crops ensuring even and optimum use of profile moisture and nutrients. Inter-cultural operations can be carried out properly and economically for control of weeds, insect and pests.



Photo 1 : Wheat+mustard (9:1) mixed cropping system

SCOPE OF APPLICATION

Wheat+mustard (9:1) mixed cropping technology is recommended for adoption by the farmers of the states and region where maize crop is grown extensively as a *kharif* crop, particularly Uttarakhand, Himachal Pradesh and Jammu & Kashmir for conserving natural resources and enhancing productivity for higher net returns in maize-wheat under rainfed conditions.