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# Performance of rajmash (*Phaseolus vulgaris* L.) under varying dates of sowing in West Bengal

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Pulses play a vital role in diversifying cropping systems and protecting soil health as well as reducing soil erosion. Rajmash (*Phaseolus vulgaris* L.) is such an important pulse crop which can be introduced in north-eastern plains during *rabi* season. The crop is highly sensitive to climatic variations (Chauhan *et al.,* 2005). Planting time has profound effect on crop growth and productivity. Advanced as well as delayed sowings cause substantial reduction in yield (Ali and Lal, 1991; Ali and Mishra, 2000). Keeping this in view, the present study was taken up to determine the optimum sowing time besides identifying the genotypes suitable for cultivation under West Bengal situation.

A field trial was conducted at the Pulses and Oilseeds Research Station, Berhampore, Murshidabad, West Bengal during *rabi* season of 2004-05. The experimental soil was sandy loam in texture having pH 7.2., EC value 0.22 $dsm^{-1}$, organic carbon 0.36%, available $P_2O_5$ 103 kg $ha^{-1}$, and available $K_2O$ 96 kg $ha^{-1}$ . The trial was laid out in a split-plot design with three replications.The genotypes of rajmash *viz.* IPR 96-4, HUR 203, HUR 301, PDR 14, HUR 137, SKUR 19 and Amber) were allocated in main plots and sowing dates *viz.* first week of October (02.10.2004), fourth week of October (26.10.2004), third week of November (20.11.2004) and second week of December (13.12.2004) were allocated in sub-plots. The genotypes were sown at a spacing of 30 cm x 10 cm, using seed rate of 130-140 kg $ha^{-1}$, depending upon seed size. Individual plot size was 4 m x 3 m. A fertilizer dose of N: $P_2O_5$:$K_2O$ at 80-60-60 kg $ha^{-1}$ was given to all the plots. Half of the nitrogen and full dose of phosphate and potash was placed in seed furrows as basal and the remaining amount of nitrogen was top dressed at 25 days after sowing. Other recommended package of practices was meticulously followed to raise the crop. Observations were recorded on plant height (cm), days to 50% flowering, days to maturity, branches $plant^{-1}$, seed yield (kg $ha^{-1}$) and its attributes.

Among the genotypes, highest seed yield of 930 kg $ha^{-1}$ was recorded by IPR 96-4 in sowing on fourth week of October when PDR 14, Amber and HUR 203 yielded 867, 837 and 820 kg $ha^{-1}$, respectively (Table 2). As per mean data on sowing dates, though the genotype IPR 96-4 yielded the highest (690 kg $ha^{-1}$), but it was at par with PDR 14 (644 kg $ha^{-1}$). Higher yields under these two genotypes might be due to maximum number of pods $plant^{-1}$.Comparatively poor yields were registered with HUR 137 (457 kg $ha^{-1}$) and SKUR 19 (458 kg $ha^{-1}$). The genotypes SKUR 19, HUR 137 and Amber flowered earlier whereas SKUR 19 and IPR 96-4 matured earlier (Table 1).

Delay in sowing showed gradual decrease in seed yield (Table 2). Singh (1997) and Mozumder *et al.* (2003) were of similar opinion. There was yield reduction by 53.5% due to delay in sowing by 6 weeks beyond October whereas it was 16.3% if sowing was advanced by 3 weeks from the fourth week of October. Such reduction in yield might be attributed to decrease in values for number of pods $plant^{-1}$, seeds $pod^{-1}$ and branches $plant^{-1}$ with delay in sowing. A reverse trend was also noticed for days to 50% flowering and days to maturity under delayed sowing. Yield loss under advanced sowing might be due to the fact that there was excessive vegetative growth including branching and height of crop plants (Table 1). According to Mishra *et al.* (1998), the optimum sowing time was early November whereas Das *et al.* (1996) and Mozumder *et al.* (2003) recorded higher crop yield under mid. November planting. Ali and Lal (1991) reported the ideal time of planting the crop between end of October to first week of November both in north-east plain and central zones.

So far as the interaction between genotype and sowing time was concerned (Table 2), it was noted that higher yields for all the genotypes excepting HUR 301 were obtained in sowing on $4^{th}$ week of October. The crop took more time to flower

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and mature when sowing was done beyond the month of October (Table 1). Mozumder *et al.* (2003) reported that earlier planting resulted in a longer time for flowering and fruiting, compared with late planting which exhibited lesser production of pods and pod yield.

The results of the investigation revealed that both the advanced sowing by the first week of October and delayed sowing by the third week of November or afterwards were not found suitable under West Bengal situation. Thus, the optimum time for rajmash sowing was found to lie between the end of October to early November. Among the genotypes, IPR 96-4 and PDR 14 exhibited their superiority over the others in respect of yield.

**Table 1. Effect of genotypes and sowing time on crop growth and yield attributes of rajmash.**

| Treatments | Plant height (cm) | Days to 50% flowering | Days to maturity | Branches Plant$^{-1}$ | Pods plant$^{-1}$ | Seeds pod$^{-1}$ | 100-seed wt. (g) |
|---|---|---|---|---|---|---|---|
| **Genotype (G)** | | | | | | | |
| IPR 96-4 | 29.0 | 48 | 101 | 3.4 | 8.8 | 3.8 | 27.6 |
| HUR 203 | 29.2 | 45 | 107 | 2.6 | 6.6 | 3.5 | 29.1 |
| HUR 301 | 24.4 | 47 | 108 | 2.8 | 6.0 | 3.9 | 29.7 |
| PDR 14 | 31.8 | 45 | 103 | 2.8 | 7.9 | 3.6 | 24.9 |
| HUR 137 | 30.0 | 44 | 107 | 2.8 | 6.6 | 3.7 | 34.2 |
| SKUR 19 | 24.3 | 41 | 100 | 3.2 | 6.5 | 3.5 | 29.2 |
| Amber | 34.7 | 44 | 108 | 3.4 | 7.5 | 3.7 | 35.0 |
| **C.D (P=0.05)** | **1.8** | **1.2** | **1.5** | **0.5** | **1.2** | **0.4** | **2.0** |
| **Sowing time (S)** | | | | | | | |
| 1st week of Oct. | 38.1 | 38 | 103 | 3.4 | 9.2 | 4.0 | 33.8 |
| 4th week of Oct. | 30.8 | 42 | 102 | 3.6 | 8.9 | 3.8 | 37.2 |
| 3rd week of Nov. | 24.4 | 49 | 106 | 2.7 | 5.8 | 3.4 | 27.9 |
| 2nd week of Dec. | 22.8 | 49 | 108 | 2.3 | 4.5 | 3.5 | 20.8 |
| **C.D (P=0.05)** | **1.3** | **1.2** | **1.3** | **0.3** | **0.9** | **0.3** | **1.1** |
| **Interaction (G x S)** | | | | | | | |
| **C.D (P=0.05)** | **3.5** | **3.1** | **3.4** | **NS** | **NS** | **NS** | **3.7** |

**Table 2. Interaction effect between genotype and sowing time on seed yield (kg ha$^{-1}$)**

| Genotype | Sowing time: 1st week of October | 4th week of October | 3rd week of November | 2nd week of December | Mean |
|---|---|---|---|---|---|
| IPR 96-4 | 763 | 930 | 607 | 460 | **690** |
| HUR 203 | 553 | 820 | 407 | 370 | **538** |
| HUR 301 | 690 | 663 | 347 | 313 | **503** |
| PDR 14 | 733 | 867 | 547 | 430 | **644** |
| HUR 137 | 563 | 647 | 377 | 240 | **457** |
| SKUR 19 | 513 | 643 | 376 | 297 | **458** |
| Amber | 703 | 837 | 420 | 400 | **590** |
| **Mean** | **646** | **772** | **440** | **359** | **-** |

| | Genotype(G) | Sowing time(S) | Interaction(GxS) |
|---|---|---|---|
| **CD(P=0.05)** | **74.1** | **46.0** | **NS** |
| **C.V. (%)** | **-** | **-** | **12.4** |

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