Mechanical Harvesting of Extra-short-duration Pigeonpea

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Traditional pigeonpeas are tall and bushy, which means their mechanized cultivation is difficult or impossible. Development of short-statured, extra-short-duration pigeonpea lines such as, ICPL 83006, ICPL 83015, ICPL 84023, and ICPL 85010 has created the opportunity to make pigeonpea amenable to commercial, mechanized field production.

Because the newly developed extra-short-duration lines are similar in height to wheat, there is no problem in adopting mechanical interculture and insecticide spraying operations using equipment designed for cereal crops. However, because of their thick and woody stem, the feasibility of mechanical harvesting and threshing of pigeonpea by a combine harvester was considered doubtful specially at higher latitudes where the growth is usually more than at lower latitudes. Despite this concern, Wallis et al. (1981) have successfully demonstrated the mechanized harvesting of short-duration pigeonpeas in Australia (27°latitude) and Fiji (17°S latitude). They used leaf defoliants before harvesting by a combine harvester. The present study was conducted at Hisar in northern India (29°N latitude) to test the feasibility of using a wheat combine in harvesting pigeonpeas at higher latitudes.

Three extra-short-duration determinate pigeonpea lines, ICPL 83006, ICPL 83015, and ICPL 84023, were sown on 30 Jun 1987 in 0.1 ha plots (10 m x 100 m) at the row spacing of 30 cm. Plants were spaced 10 cm apart within rows. The plant height of these lines varied from 1.1 m (ICPL 84023) to 1.5 m (ICPL 83006). At complete maturity the combine harvester, model Swaraj 8100, 110 HP having 4.4-m wide blade normally used for harvesting wheat was used to harvest the pigeonpea plots (Fig. 1). The combine cutting bar was put 80-cm above the ground. No defoliant was used. After passing through the field the combine left no plants unharvested. Breakage of seed was margin-

ally higher than hand harvesting and threshing. This was because no adjustment for cylinder speed and screen size was made as the screen used was that for wheat. It is probable that with appropriate adjustment to the combine harvester pigeonpea seed breakage can be reduced. Since, only the top-podded portion of the plants were cut and taken into the combine harvester and all the leaves had dried the crop and residue passed through the combine harvester unhindered. The grain yield obtained (2.2 to 2.8 t ha^{-1}) was similar to that obtained by manually harvesting other plots. Since the cutting height was 80-cm above the ground and the cut was horizontal without any sharpened ends, there was no danger of damage to the rubber combine harvests or to the tractor wheels on subsequent land preparation activities. Normally the dried stalks are pulled out after the field had been irrigated to prepare it for wheat sowing. The stalks are generally used as fuel wood.

The above observations indicate the feasibility of harvesting and threshing mechanically the newly bred determinate extra-short-duration pigeonpea cultivars with a combine. This offers the large progressive wheat-growing farmers the option of using their wheat combines for harvesting pigeonpea. This practice can save both time and labor, which in October/November prior to sowing wheat are at premium demand. Consequently farmers usually cut the pigeonpea plants and store them for threshing later when more time permits. The prolonged storage of these harvested material in the open usually results in the loss of grain quantity and quality because of high humidity.

Reference

Wallis, E.S., Byth, D.E., and **Whiteman, P.C.** 1981. Mechanized dry seed produc
51-60 *in* Proceedings of the International Workshop on Pigeonpea, 15-19 Dec 1980, ICRISAT Center, India. Vol.1. Patancheru, A.P. 502 324, India: International Crops Research Institute for the Semi-Arid Tropics.

Figure 1. An extra-short-duration line, ICPL 84023, being harvested by a combine harvester, Hisar, rainy season 1987.