Impact of Cluster frontline demonstrations (CFLD) oil seeds on increasing yield of Niger (*Guizotia abyssinica* L.) in tribal district of Mandla, Madhya Pradesh

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Abstract

The study was carried out by Krishi Vigyan Mandla district of Madhya Pradesh to know the yield gaps between scientific package and practices under cluster front line demonstration (CFLD oilseeds) and farmer’s practice (FP) of Niger crop under rainfed condition. Cluster Front Line Demonstration on Niger were conducted on farmer’s fields during kharif season of two sequential years i.e. 2018-2019 and 2019-2020 under National Food Security Mission (NFSM), Govt. of India to demonstrate the impact of enriched agro-techniques on production and economic benefits under rainfed conditions. CFLD’s were conducted in 21.6 ha and 20 ha area for two years with active involvement of 104 farmers and scientific staff of Krishi Vigyan Kendra, Mandla. According to analysis of data the highest grain yield was obtained in demonstrated plots with an average of 5.53 q/ha as compared to local check with an average of 3.68 q/ha. An average mean of extension gap, technology gap and technology index were calculated as 1.85 q/ha, 1.97q/ha, 26.27 percent, respectively. Adoption of improved package of practices in Niger cultivation recorded average higher B:C ratio (2.82) as compared to Farmers Practice (2.47) during the period of study. Thus, the productivity of Niger could be increased with the adoption of recommended improved package of practices. The study resulted in satisfying the farming community for higher productivity and returns.

Keywords: Niger, front line demonstration, technology gap, impact, existing, technology index

Introduction

Tribal district of Mandla, Madhya Pradesh in India situated at an elevation of 1,768 feet (539 meters) above sea level an upland plateau at a U-shaped bend in the Narmada River where it is joined by the Banjar River. Mandla district has an area of of 8771 km². There are 9 blocks, 4 tehsils and 1214 villages in the district. Niger (*Guizotia abyssinica*) L. commonly known as ramtil, jagni or jatangi (Hindi), ramtal (Gujrati), karale or khurasani (Marathi), uhechellu (Kannada), payellu (Tamil), verrinuvvulu (Telugu), alashi (Oriya), sarguza (Bengali), ramtil (Punjabi) and sorguja (Assamese) in different parts of the country. It is an important edible oilseed crop of Indian tribal communities, which contains edible oil 38–43%, protein 20% and sugar 12%. As because Niger can be grown with minimum agro inputs, it is considered to be a crop for resources poor farmers particularly in developing countries like India. India is the chief producer of Niger seeds which ranks second and fourth position in the world for its acreage and annual production respectively (Dalei *et al*., 2014). It is grown in the states of Madhya Pradesh, Chhattisgarh, Odisha and Maharasstra and to a lesser extent in Karnataka, Bihar, Jharkhand, Gujarat and Andhra Pradesh. The niger seed has nearly 40% of oil which is used in foods, paints, soft soaps, lighting, lubrication and cosmetics (DOR, 2013). In India about 75% of the harvested seeds are used for oil extraction and the rest is exported for bird food. Roasted or fried seeds are eaten as snacks or used as a condiment. The press cake after oil extraction contains 31–40% protein and is used as cattle feed. Since, the crop is cultivated by poor tribal farmers in the interiors of villages in scattered fields. KVK’s are grass root level organizations meant for spreading of technology through refinement, assessment and demonstration of proven production technologies under different micro-farming situations (Das, 2010). The main aim of Krishi Vigyan Kendra is to reduce the time lag between generations of technology at the research and its transfer to the farmers for increasing productivity and income from agriculture and allied sectors. The main objective of Cluster Front Line Demonstration under National Food Security Mission was to demonstrate improved
crop production technologies of oilseeds on the farmers field and to popularize the newly notified improved varieties auto 
technologies for varietal diversification and efficient 
management of resources the present investigation was 
undertaken to study the impact of cluster frontline 
demonstration on yield of Niger (Guizotia abyssinica L.) 
under rainfed condition in Mandla district of Madhya Pradesh 
with the objective of increasing productivity and executed to 
narrow down the time lag and insured speedy adoption of 
technologies in district.

Materials and Methods
Cluster Frontline Demonstrations (CFLDs) on improved farm 
technology (Table 1) were conducted by Krishi Vigyan 
Kendra Mandla of JNKVV Jabalpur in Niger (JNC9) during 
kharif 2018-2019 and kharif 2019-2020 under rainfed 
conditions on 41.6 ha area of Mandla district covering 104 
farmers. The improved technology such as improved varieties 
seed (JNC9) method of line sowing with Nari plough and seed 
drill, seed treatment with vitavax power and bio control 
agents weed management and integrated pest management 
practices was maintained during period of study seed 
treatment was done with vitavax power 2 gm/kg seed 
trichoderma at @ 5 gm/kg and PSB @ 5 gm/kg of seed before 
sowing to protect the crop against fungal diseases up to 20-25 
days after sowing the seed rate of Niger was kept 10 kg/ha in 
demonstrations plot the sowing of Niger was done during 
10th August to 15th August during the study period the 
sowing of plots was done each year. Technology index 
was recorded 26.27%. Lower the value of 
technology index was 27.20% and 25.33% of demonstration plots 
the farmers field the data presented in table 2 showed that the 
technology gap was 2.04 per ha the technology gap 
observed may be attributed to the decimal dissimilarity in soil 
status, lake of irrigation facilities non congenial weather 
conditions, disease and pest attacks and change in the position 
of demonstrations plots every year. Technology index 
specified the feasibility of the generated Technology at the 
farmer’s fields under existing agro climatic conditions (Vedna 
et al. 2007) [9]. The results of table 2 revealed that value of 
technology index was 27.20% and 25.33% during 2018-19 
and 2019-20 respectively. Whereas the average value of 
technology index was recorded 26.27%. Lower the value of 
technology index more is the feasibility and applicability of 
the tested technology. This showed that a gap existed 
between technology evolved and technology adopted at 
farmer's field. The similar results were also observed by 
Gangadevi et al. 2018, Chaudhari et al. 2019 and Jamwal 
Anamika et al. 2020

Results and Discussion
The findings of the study as well as relevant discussion have 
been conferred under following points.

Grain Yield
Data presented in Table 2 revealed that transfer of improved 
technology under Cluster Frontline Demonstrations in Niger 
resulted in higher yield as compared to farmer's practice. The 
higher yield in demonstration plot was due to improved 
variety of seed, seed treatment with bio control agent, 
integrated pest management practices. The average seed yield 
of demonstration plots was 5.53q/ha (Table 2) which was 
higher as compared to farmers practice 3.68 q/ha. The 
increased yield percentage over control was 50.05% in 
Cluster Frontline Demonstration over local check. However 
the seed yield of 5.53 q/ha in CFLD's was low as compared to 
potential yield 10 quintal per hectare of Niger variety JNC9 
due to attack of Niger pod fly. The yield enhancement 
through adoption of improved technology has also been 
reported in earlier studies of FLD’s (Kothyari et al. 2018 and 
Kumat et al. 2019 and Jamwal Anamika et al. 2020). Yield of 
the Frontline Demonstration trials and potential yield of the 
crop was compared to estimate the yield gaps which were 

Extension Yield gap
An average extension gap between demonstrated practices 
and farmers practices was recorded 1.85 q/ha (Table2). Higher 
extension gap in present study suggested that there is a 
need to motivate and aware the farmers for adoption of 
improved technologies in Niger over existing local farm 
practices. The similar results were also reported by Bairwa et 
2020.

Technology Yield gap and Technology Index
The technological gaps generally appear even if the CFLD'S 
were conducted under the strict direction of farm scientists on 
the farmers field the data presented in table 2 showed that the 
value of technological gap was lower 1.90 to till per hectare 
during the year 2019-20 while during 2018-19 the 
technological gap was 2.04 per ha the technology gap 
observed may be attributed to the decimal dissimilarity in soil 
status, lake of irrigation facilities non congenial weather 
conditions, disease and pest attacks and change in the position 
of demonstrations plots every year. Technology index 
spelled the feasibility of the generated Technology at the 
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Table 1: Technology demonstrated in CFLD’s and Farmer’s practices

<table>
<thead>
<tr>
<th>S/No.</th>
<th>Intervention</th>
<th>Demonstrated Intervention</th>
<th>Farmers Intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Field preparation</td>
<td>2 ploughings</td>
<td>Single plough</td>
</tr>
<tr>
<td>2</td>
<td>Method of sowing</td>
<td>Line sowing by seed drill &amp; Nari</td>
<td>Broad casting</td>
</tr>
<tr>
<td>3</td>
<td>Seed variety</td>
<td>JNC9</td>
<td>Local</td>
</tr>
<tr>
<td>4</td>
<td>Seed treatment</td>
<td>vitavax power @ 2 gm/kg seed, PSB @ 5gm/kg seed</td>
<td>Not treated</td>
</tr>
<tr>
<td>5</td>
<td>Seed rate</td>
<td>10kg/ha</td>
<td>15-20 kg/ha</td>
</tr>
<tr>
<td>6</td>
<td>Manures and fertilizers</td>
<td>PSB 500ml, with 100kg vermicompost and sulphur</td>
<td>20:40:20:10</td>
</tr>
<tr>
<td>7</td>
<td>Weed management</td>
<td>Pendimethaline @ 2.5lit/ha</td>
<td>No pre emergence used</td>
</tr>
<tr>
<td>8</td>
<td>IPM measures</td>
<td>IPM practices like spray of Neem oil and pheromone traps, yellow sticky traps</td>
<td>Imbalance use of pesticides</td>
</tr>
<tr>
<td>9</td>
<td>Technical guidance</td>
<td>Time to time</td>
<td>Nil</td>
</tr>
</tbody>
</table>

Table 2: Year wise productivity, extension gap, technology gap and technology index of Niger under CFLD’s and existing package of practices.

<table>
<thead>
<tr>
<th>Year</th>
<th>Yield q/ha</th>
<th>Increase yield % over Control</th>
<th>Extension gap (q/ha)</th>
<th>Technology gap (q/ha)</th>
<th>Technology Index %</th>
</tr>
</thead>
<tbody>
<tr>
<td>2018-19</td>
<td>5.46</td>
<td>3.65</td>
<td>49.58%</td>
<td>1.81</td>
<td>2.04</td>
</tr>
<tr>
<td>2019-20</td>
<td>5.60</td>
<td>3.72</td>
<td>50.53%</td>
<td>1.88</td>
<td>1.90</td>
</tr>
<tr>
<td>Mean</td>
<td>5.53</td>
<td>3.68</td>
<td>50.05%</td>
<td>1.85</td>
<td>1.97</td>
</tr>
</tbody>
</table>

Table 3: Cost of cultivation, Gross return and B:C ratio of Niger under CFLD’s and existing package of practices.

<table>
<thead>
<tr>
<th>Year</th>
<th>Cost of Cultivation (Rs/ha)</th>
<th>Gross Return (Rs/ha)</th>
<th>Net Return (Rs/ha)</th>
<th>B:C Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>2018-19</td>
<td>10500</td>
<td>8000</td>
<td>29484</td>
<td>19710</td>
</tr>
<tr>
<td>2019-20</td>
<td>10700</td>
<td>8200</td>
<td>30240</td>
<td>20088</td>
</tr>
<tr>
<td>Mean</td>
<td>10600</td>
<td>8100</td>
<td>29862</td>
<td>19899</td>
</tr>
</tbody>
</table>

Economic analysis of Cluster Front Line Demonstrations

Average cost of cultivation of demonstration plot (Rs10600/ha) is more as compared to Farmer's practice (Rs 8100/ha). The data in table 3 clearly clarified the implication of Cluster Frontline Demonstration at Farmer's field during the period of study in which higher average net return rupees 19262 were acquired under Demonstration plots as compared to farmer's practice (Rs 11799/ha). Benefit cost ratio recorded was also higher in demonstration plots (2.82) as compared to farmer's practice (2.47) increased monetary returns as well as Benefit cost (B:C) ratio through improved farm technology have also been reported by various scientists (Vedna et al. 2007, Bairwa et al. 2013 and Jamwal Anamika et al. 2020) [1, 9].

Conclusion

The present study indicated that the incorporation of improved farm technology practices along with active participation of farmer's of the area has positive effect on increasing the grain yield and economic return of Niger in Mandla district the economic viability of suitable technology for increasing the productivity of Niger motivated the farmers towards adoption of technologies demonstrated at farmer’s field.

Reference