Adaptation and Evaluation of Improved Pepper Varieties

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Abstract
Shekatekli (Mitswa) irrigation scheme is the most potential areas for pepper production. However, the yield and yield components of pepper producing at the specified area is low. An experiment was conducted on adaptation and evaluation of pepper varieties in 2005/2006 and 2006/2007 cropping seasons to enhance the production and productivity of pepper. The experiment was carried out at farmers’ plot of land having four varieties in three replications. The treatments or varieties were Melkashote, Bacolocal, Marakofana and Melkawaze. In general, the result of the experiment implied that Melkawaze was the high yielder of all.

Keywords: yield, Pepper, yield components

1. INTRODUCTION
Pepper (Capsicum annuum L.) is the world’s most important vegetable after tomato and used as fresh, dried or processed products, as vegetables and as spices or condiments (Acquaah, 2004). Capsicum annuum L. is commonly grown worldwide, with many general names in English, such as hot pepper, chili or chile pepper, and as well sweet pepper and bell pepper (Bosland, 1996). Chili belongs to the family Solanaceae and genus Capsicum. The genus Capsicum comprises 20-30 species (Lovelock, 1973). The pre-Columbian, indigenous Nahua (Aztec) Amerindian name for the plant was transcribed as chilly and the usual name in Spanish is chile, which results in the plurals of chillies, chilies, and chiles (Bosland, 1996).

Capsicum originated from tropical America; Peru and Mexico and spread to Europe where it grows as a shrub. From here it spread to other parts of the world such as African, Caribbean and Pacific countries (Dennis, 2013).

Capsicum annuum is usually grown as a herbaceous annual in temperate areas. However, ecologically it is a perennial shrub in tropical areas (which may live a few years to a few decades) and it can be grown as a perennial in climate-controlled greenhouses (Andrews, 1999). The species includes the vast majority of the cultivated pepper. Moreover, it includes both pungent and non-pungent (sweet) pepper species. There is phenotypic diversity in plant habit and especially in shapes, sizes, colours, pungency, and other qualities of the fruits among the species (Andrew, 1999). Chili pepper is a popular vegetable valued around the world for the color, flavor, spice, and nutritional value it contributes to many meals. Pepper varieties display a wide range of plant and fruit traits, and production practices vary greatly from region to region (Berke et al., 2005).

As a result of its multiple uses, pepper is produced in many parts of the Ethiopia (MARC, 2004). Although the time when the crop introduced to Ethiopia not certainly known, pepper cultivation in the country the most ancient of any other vegetable product (EEPA, 2003). Moreover, hot pepper has been cultivated in Ethiopia for long period of time (MARC, 2004).

2. OBJECTIVES
➢ To select the best pepper varieties with the participation of farmers
➢ To popularize the best selected varieties in the area

3. MATERIALS AND METHODS
3.1. Site Description
The experiment was conducted in Tanqua-Abergelle woreda at Shekatekli (Mitswa) irrigation scheme. Abergelle is situated in the central zone of the region which is about 120 kms away from Mekelle, the administrative city of Tigray. It is located 13°14'06"N latitude and 38°58'50"E longitude (CSA, 2000 In: Gebreyesus Berhane, 2004). It is agro-ecologically characterized as hot to warm sub-moist low land (SM1-4b) below 1500m.a.s.l. The mean annual rain fall and temperature is 350-700mm & 24-41°C respectively. The rain fall is erratic and unproductive nature (Legesse, 1999. In: Gebreyesus Berhane, 2004).

3.2. Treatments
i. Bako local
ii. Melkashote
iii. Melka Awaze
iv. Marakofana
3.3 Plant Establishment
In nursery site, the seeds were planted in well prepared seed bed and the seed beds were covered or mulched with grass. After 48 days of planting, healthy and vigorous seedlings were transplanted to the field. After transplanting 200kg/ha DAP and 100kg/ Urea in split form (50% during planting and 50% after one and half month) were applied. The trial were conducted at Sheka Tekli irrigation schemes (FTC) using randomized complete block design (RCBD in three replications having a plot size of 3mx4.2m. The spacing between plots, rows and plants were 50cm, 70cm and 30cm respectively.

3.4 Data collected
- Sowing dates
- Days to emergence
- Transplanting date
- Days to flowering (50%)
- Number of fruits per plant
- Fruit length and diameter (cm)
- Plant height (cm)
- Average fruit weight (kg)
- Marketable and unmarketable yield (kg/ha)
- Total yield (kg/ha)

4. RESULT AND DISCUSSION

<table>
<thead>
<tr>
<th>Table 1. Effect of different varieties on yield Components of pepper in Shekatekli irrigation scheme</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Varieties</strong></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Bako local T1</td>
</tr>
<tr>
<td>Melkawaze T1</td>
</tr>
<tr>
<td>Marakofana T4</td>
</tr>
<tr>
<td>Melkashote T1</td>
</tr>
</tbody>
</table>

LSD  
CV  
SED
Where: Y1= 2005/2006 Cropping season  
Y2= 2006/2007 Cropping season

**Days to 50% Emergence, transplanting date and days to 50% flowering**
The analysis of data during the two cropping season showed that there was no statistically significant difference among pepper varieties at (p= 5%) in response to days to germinate. In both years of production, days taken to 50% germination of all varieties were equal. All varieties averaged took 11 and half day for germinate. Not only this but also, there was no difference in transplanting date. All pepper varieties were transplanted in 48 days and 47 days in year one and two respectively. Although there was no significance difference in that of days to 50% flowering the highest and the lowest mean days from the two years were recorded from Baco loca l (82.83 day) and Markofana and Melkawaze (82.50) respectively.

**Fruit number per plant:**
The analysis of data 2005 cropping season showed that there was statistically significant difference at (p= 5%) among the variety of pepper in relation to fruit number per plant. The highest and lowest fruit numbers per plant were observed in Melkawaze (46.30) 1 and Baco local (24.70). However, this statistical difference was not repeated in the second year production season. In the second year of production, the differences observed among treatments were numerical; not statistical.
Table 2. Effect of different varieties on yield Components of pepper in Shekatekli irrigation scheme

<table>
<thead>
<tr>
<th>Varieties</th>
<th>average fruit wt/g</th>
<th>Fruit length(cm)</th>
<th>Fruit diameter (cm)</th>
<th>Plant height (cm)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Y1</td>
<td>Y2</td>
<td>Mean X</td>
<td>Y1</td>
</tr>
<tr>
<td>Bako local</td>
<td>6.47³</td>
<td>6.33³</td>
<td>6.40</td>
<td>8.870BC</td>
</tr>
<tr>
<td>Melkawaze</td>
<td>8.47³</td>
<td>9.20³</td>
<td>8.83</td>
<td>10.400³</td>
</tr>
<tr>
<td>Marakofana</td>
<td>7.60³</td>
<td>9.66³</td>
<td>8.66</td>
<td>11.130³</td>
</tr>
<tr>
<td>Melkashote</td>
<td>8.17³</td>
<td>7.3³</td>
<td>7.75</td>
<td>10.3³</td>
</tr>
<tr>
<td>LSD</td>
<td>1.112</td>
<td>1.16</td>
<td>0.4831</td>
<td></td>
</tr>
<tr>
<td>CV</td>
<td>7.42</td>
<td>8.6</td>
<td>9.38</td>
<td>8.70</td>
</tr>
<tr>
<td>SED</td>
<td>7.47</td>
<td>0.43</td>
<td>0.39</td>
<td>0.33</td>
</tr>
</tbody>
</table>

Where: Y1 = 2005/2006 Cropping season
Y2 = 2006/2007 Cropping season

**Fruit weight (gm):**

Fruit weight of pepper showed statistically significance among the varieties in both years of production (p ≤ 5%). The highest and lowest fruit weight in the first year, was recorded in Melkawaze and Baco local which accounts 8.47gms and 6.47gms respectively.

**Fruit Length (cm):**

As fruit length of the pepper variety is concerned, there was statistically significant difference (p ≤ 5%) among pepper varieties in first cropping season, Melkashote which is statistically similar with Melkawaze (10.40cm) showed the highest fruit length (11.13cm) and Markofana which is statistically similar with Baco local (8.87cm) showed the lowest fruit length (8.53cm). However, there were no significance difference of fruit length in all varieties of pepper in the second production season.

**Fruit diameter (cm):**

The analysis of variance showed that there was statistically significance difference at (p ≤ 5%) among pepper varieties at (p ≤ 5%). The highest and lowest diameter in year one were recorded from Markofana and Melkashote which was 1.493cm and 1.013cm respectively. However, there was no significance difference in the second cropping season.

**Plant height (cm):**

Based on the analysis of variance, there was significance in year one. The highest and lowest diameter in year one were recorded from Markofana and Melkashote which was 1.493cm and 1.013cm respectively. However, there was no significance difference in the second cropping season.

**Table 3. Effect of different varieties on yield and yield Components of pepper in Shekatekli irrigation scheme**

<table>
<thead>
<tr>
<th>Varieties</th>
<th>Days to 50% maturity</th>
<th>Marketable yield Qt/ha</th>
<th>Unmarketable yield Qt/ha</th>
<th>Total yield (Qt/ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Y1</td>
<td>Y2</td>
<td>Mean X</td>
<td>Y1</td>
</tr>
<tr>
<td>Bako local</td>
<td>126.670³</td>
<td>118.33</td>
<td>122.5</td>
<td>92.70</td>
</tr>
<tr>
<td>Melkawaze</td>
<td>127.70³</td>
<td>119.00</td>
<td>123.33</td>
<td>126.28³</td>
</tr>
<tr>
<td>Marakofana</td>
<td>128.000³</td>
<td>119.33</td>
<td>123.66</td>
<td>106.20³</td>
</tr>
<tr>
<td>Melkashote</td>
<td>126.330³</td>
<td>119.66</td>
<td>122.48</td>
<td>108.10³</td>
</tr>
<tr>
<td>LSD</td>
<td>1.09³</td>
<td>0.7</td>
<td>0.81³</td>
<td>58.27³</td>
</tr>
<tr>
<td>CV</td>
<td>0.68</td>
<td>0.7</td>
<td>6.67³</td>
<td>12.8³</td>
</tr>
<tr>
<td>SED</td>
<td>0.29</td>
<td>0.26</td>
<td>4.018³</td>
<td>7.64³</td>
</tr>
</tbody>
</table>

Where: Y1 = 2005/2006 Cropping season
Y2 = 2006/2007 Cropping season

**Days to Maturity**

The analysis of data during 2005/2006 cropping season showed that there was statistically significant difference among pepper varieties at (p ≤ 5%). The highest maturity date was recorded from Markofana(128.days). However, it was statistically similar with Melkawaze (127.69days) and Baco local (127.67days). The lowest days to maturity was recorded in that of Melkashote (126.33days). In 2006/2007 production season, all the treatments(variety) of pepper showed statistically similar maturity dates. But the highest and the lowest days to maturity were recorded in Melkashote and Baco local which were 119.66 days and 118.33 days respectively.

**Marketable Yield (qt/ha):**

Regarding with marketable yield of pepper, the analysis of data during the 2005/2006 cropping season showed that there was statistically significant difference at (p ≤ 5%) among the varieties in marketable yield/ha. The highest and lowest marketable yield was observed in Melawaze and Baco local which were 126.28qt and 92.70qt respectively. In the second season (2006/2007 cropping season). The analysis of variance showed significance difference in response to marketable yield/ha. The highest and the lowest marketable yield were observed in
Bacolocal and Melkashote which was 163Qt and 107.04Qt respectively.

Unmarketable yield qt/ha
The analyzed data in both production seasons showed that there was no significance difference in response to unmarketable yield.

Total Yield Qt/ha
As we can see from the table, in the first production season, there was any loss of production. This implies that marketable yield/ha equivalent to that of total yield/ha. In 2006/2007 production season, Bacolocal, Melkawaze and Markofana showed statistical similarity in relation to total yield/ha and Melkashote was significantly different from others. The highest total yield/ha which was 165.13Qt was recorded from Bacolocal and the lowest from Melkashote (110.85).

5. CONCLUSIONS AND RECOMMENDATIONS
The research was conducted in a farmer land of Shekatekli irrigation Scheme in 2005/2006 and 2006/2007 production seasons. Among the varieties of pepper (Melkawaze, Markofana, Melkashote and Bacolocal), Melkawaze gave good yield in both production seasons however, although Bacolocal was considered as low yielder in the first production season, it sharply increases its yield in 2006/2007 production season and become statistically similar with Melkawaze and Markofana. Not only this but also most farmers prefer Bacolocal due to high fruit number/plant in the second production season. The yield for Markofana in the experiment was much lower of Melkawaze and Bacolocal. But farmers prefer it for Awaze (dry pod yield). Therefore, farmers are better to use Melkawaze and Bacolocal for better pepper yield. However, if their intention is dry pod yield they have to use Markofana.

6. REFERENCES