**Evaluation of Improved Potato (*Solanum tuberosum* L) Varieties for Growth, Yield and Qualities at Gircha Research Center, Southern Ethiopia**

**Zerihun Sinta\* and Bahilu Asrat**

Arba Minch University, College of Agricultural Science, P.O.Box:21, Arba Minch, Ethiopia

zesishe2003@yahoo.com \*; +251910450888

***Abstract***

*This experiment was carried out to evaluate the performance of five released potato varieties namely (Gorebela, Gera, Gudene, Tolicha and Jalene) and one local cultivar. The experiment was laid out as a randomized complete block design with three replications. The results of the study revealed that all of the variables considered were significantly affected by varieties. The maximum plant height was recorded from variety Tolicha and minimum from Gera. The highest number of main stem was recorded from variety Jalene followed by Local and the lowest number of main stem was from variety Gorebela. Gera produced highest tuber number per hill, whereas Tolicha produced lowest total tuber number per hill. The highest tuber weight per hill, average tuber weight, total tuber yield and marketable tuber yield was recorded for Gudene, while in reference tuber weight per hill Jalene produced the lowest, and in case of average tuber weight, total tuber yield and marketable tuber yield local produced the lowest. The maximum unmarketable tuber was produced from Local, while the minimum from Gudene. The highest dry matter content, specific gravity and starch content were recorded from variety Gudene whereas Gorebela and Jalene recorded the lowest. The results also revealed that the presence of considerable variations for tuber yield and yield component among varieties. Therefore, variety Gudene which was given high yield could be used to increase production and productivity of the crop for better enhancement of food security and livelihood income of the locality.*

***Key words****: Growth; Potato; Tubers; Varieties; Yield.*

**INTRODUCTION**

Ethiopia has possibly the very best potential for potato production of any country in Africa. There is a high potential to expand the cultivation area of the potato crop, as 70% of the country's arable land has potentially suitable to potato cultivation (Gebremedhin *et al.,* 2008). Most of the available agricultural land is found at an altitude of 1800-2500 m.a.s.l and receive an annual rainfall of quite 600 - 1200 mm, which is suitable for potato production (Yilma, 1991). The low acreage and productivity of potato in Ethiopia are attributed to several factors. The major ones are lack of well adapted and high-yielding cultivars, unavailability and high cost of seed tubers, inappropriate agronomic practices, and lack of suitable post-harvest technologies, pests and disease (Berga *et al.,* 1994; Tekalign, 2005; Endale *et al.,* 2008; Gildemacher *et al.,* 2009). Different sorts of potato are grown by farmers a number of which are local are improved varieties. Around 98.7% of the seed tubers required in Ethiopia are supplied from the local varieties (Tekalign, 2005). The seed tubers supplied by this technique have poor sanitary, physiological, physical and genetic qualities (Berga *et al.,* 1994; Tekalign T. 2005; Adane *et al.,* 2010). The farmers prefer best performing varieties for yield and other essential agronomic traits. Their dominancy should be reliable over a wide range of environmental conditions and also over years (Mulugeta and Dessalegn, 2014).

Farming system in study area is traditional which relies on rain-fed agriculture; thus, the potato production and productivity is low due to prevalence of disease and pests, poor soil fertility, variability in climatic patterns, shortage of agricultural input supply and application, poor research-extension and farmers’ linkage, post-harvest handling practices, poor marketing and limited access to improved varieties (Mesfin *et al.,* 2014). The average productivity of potato in the production systems with local varieties in study area is only about 2.4 t ha−1 (Mesfin *et al.,* 2014). However, which was far below the national average productivity of 8 tons ha−1, and also the productivity (40 t ha−1) of improved varieties achieved in research trials (APHRD, 2009). Nowadays many improved potato varieties have been released by research centers and universities for production. However, those varieties are not fully accessed to the study area for production. The main constraints to accessing improved varieties are lack of awareness for the availability and use of improved technologies (Hirpa *et al.,* 2010) and the high prices of healthy seed tubers (Agajie *et al.,* 2013). Therefore, evaluating the performance of improved potato varieties compared with the commonly grown local variety will helps to identify best fit varieties that can ensure sustainable production. The objective of the study is to evaluate the performance of improved potato varieties.

**MATERIAL AND METHODS**

**Description of the Study Site**

The field experiment was carried out at Chencha district of Gircha highland fruit and vegetable research center in 2019 and 2020 cropping seasons. Chencha is one of the districts of Gamo Zone of Southern Ethiopia. The district is geographically located at 6°15′N 37°34′E longitude and latitude (Figure 1). The altitude ranges from 2000 to 3200 meter above sea level (masl). The agro-ecology is classified as highland (>2500 masl), which accounts for 82 % of the total area, and midland (2000–2500 masl) accounting for18 %. The minimum air temperature ranges from 11 to 13 °C, whereas the maximum ranges from 18 to 24 °C. The mean annual average rainfall is 750mm-1000 mm and its pattern is bimodal, as the result there are two cropping seasons locally known as Belg (March to May) and Meher (June to October) (Waga*et al.,* 2016).The Gircha Highland Fruit and Vegetable Research Center is located at higher altitude (3007 masl) of the area.

**Experimental Materials and Design**

A total of five improved potato varieties which were released by different Research Centers for different agro-ecologies of the country and one local cultivar were used for this experiment. The name of the varieties, year of released and altitudes presented in (Table 1). The experiment was laid out in a Randomized Complete Block Design (RCBD) with three replications. Each plot was 3.75 m x 2.4 m = 9 m2 wide consisting of five rows, which accommodated 8 plants per row and thus 40 plants per plot. The spacing between rows and plants was 0.75m and 0.30m, respectively. The spacing between plots and adjacent replications was 1 m and 1.5 m, respectively.

**Experimental Procedures**

The experimental fields was cultivated by farmers practice to a depth of 25-30 cm and leveled; then ridges were made by hand. Medium sized (39-75g) (Lung’aho *et al.,* 2007) and well sprouted tubers were planted at the sides of ridges at the spacing of 75cm between ridges and 30cm between tubers with 5cm planting depth. Fertilizer was applied uniformly to all plots as the 92 kg P2O5 ha-1 and 110 kg N ha-1 (MoA, 2013). Phosphorus fertilizer in the form of Di-ammonium Phosphate (DAP) and the whole rate was applied at planting whereas, nitrogen fertilizer in the form of Urea was applied in two splits, half rate after full emergence (two weeks after planting) and half rate at the initiation of tubers (start of flowering). For the yield estimation, tubers were harvested from eighteen plants from the three middle rows when the plants reached physiological maturity. All other cultural practices were applied equally.

**Data Collection**

Plant height (cm) was measured as the distance from the base of the stem to the tip of five randomly selected matured plants per plot of the central rows. Number of stems per hill was determined from five randomly sampled hills per plot at physiological maturity. Average tuber weight (g/tuber) the average tuber weight was determined by dividing the total fresh tuber yield into the respective total tubers number at harvest. Tuber number per hill was determined from five randomly selected hills of central rows at harvest. Tuber yield per hill (g) was determined as the total tuber weight obtained from five randomly selected hills per plot at harvesting and it was averaged. Total tuber yield (t/ha) at harvest from 18 hills per plot was determined by adding up the weights of marketable and unmarketable tubers and converted to yield per hectare. Marketable tuber yield (t/ha) all the marketable tubers which were free from diseases, insect pests and greater than or equal to 20 g in weight was recorded as marketable tuber yield. Unmarketable tuber yield (t/ha) the tubers that were diseased, insect attacked and small-sized (< 20 g) was recorded as unmarketable tuber yield. Dry Matter Content of Tuber (%): This was determined by chopping five tubers into 1-2 cm small cubes and drying two sub-samples of 200g each taken from thoroughly mixed chopped tubers in an oven set at 80˚C for 72 hours in two paper bags until a constant weight is reached. Then the percentage of dry matter content was calculated as suggested by CIP (2007) using the following formula:

**Dry matter% = (dry weight / fresh weight) x 100**

Specific gravity (gcm-3): This was determined by weighing 5 kg of tubers in the air and then in water method (Gould, 1995) and calculated as follows:

**Specific gravity = (weight in air) / (weight in air – weight in water).**

Tuber starch content (g/100g): The percentage of starch content was calculated from the specific gravity using the following formula: (Talburt and Smith 1959).

**Starch (%) = 17.546+199.07 x (specific gravity-1.0988)**

**Data Analysis**

The data was subjected to analysis of variance (ANOVA) using SAS statistical software Version 9.1(SAS, 2007). Means of significant differences was compared using Least Significant Difference test at 5% probability level.

**RESULTS**

The results showed that varieties were significant (*P* ≤ 0.01) for growth and yield components of potato over two years (Table 2). Plant height result indicated that tallest height was recorded from Tolicha which is statistically different from all other varieties, whereas the shortest plant height was recorded from Gera. According to stem number per hill Jalene variety produced the maximum stem number per hill followed by local landraces. The minimum stem number per hill was recorded from the variety Gorebela which was statically similar with Gudene, Tolicha and Gera. However, there was statistically non-significant difference between Local landrace and variety Gera. The number of tubers per hill was recorded highest in Gera variety which is statistically different from all other varieties, whereas lowest number of tubers per hill was recorded in Tolicha variety which is statistically similar with Local and Gudene variety. According to tuber weight per hillandaverage tuber weight Gudenewas superior of the all varieties evaluated. The lowest tuber weight per hillandaverage tuber weight was obtained from Jalene and Local respectively.

The result also showed that varieties were significant (*P* ≤ 0.01) for tuber yield and quality components of potato over two years (Table 3). The highest total tuber yield was recorded from Gudene variety which is statistically different from all other varieties, whereas the lowest total tuber yield was recorded in Local variety which is statistically similar with Jalene variety. The data also indicated that Gera produced significantly higher total tuber yield over Gorebela, Tolicha, Jalene and Local. However, no significant difference was observed in total tuber yield between Gorebela, Tolicha and Jalene. According to marketable tuber yield Gudene variety was produced the maximum marketable yield with which is statistically different from all other varieties. The lowest marketable yield was recorded from Local variety. The data also indicated that Gera produced significantly higher marketable tuber yield over Gorebela, Tolicha, Jalene and Local. However, Gorebela, Tolicha and Jalene were not statistically different in marketable tuber yield. With respect to unmarketable tuber yield highest unmarketable tuber yield was recorded from Local while the lowest unmarketable tuber yield which was statically similar with Gudene. Variety Jalene, Tolicha and Gorebela were produced statically similar unmarketable tuber yield. The highest percentage of dry matter content, starch content and maximum specific gravitywas recorded from Gudene variety followed by Gera which is statistically similar with Tolicha variety, whereas, the lowest result was obtained from Jalene and Gorebela. The data also showed that there is non-significant difference between variety Tolicha and Local in all quality components.

**DISCUSSION**

Results of the study indicated that different varieties performed significantly in different variables. Tolicha, Jalene and Gera performed significantly better than other varieties in plant height, stem numbers per hill and tuber number per hill respectively. Height is a quantitative trait controlled by many genes, therefore, it is highly influenced by environmental factors like nutrient status of the soil, available soil moisture and intercepted radiation (Singh and Singh, 1973). The difference in plant height among the varieties might be associated to genetic differences, which may lead to the variable performances in growth and development (Habtam, 2012). Morena *et al.*, (1994) stated that the difference in number of main stem among the varieties might be due to the inherent genotypic variation in the number of buds per tuber which is in turn influenced by the size of the tubers, physiological age of the seed, storage condition, and number of viable sprouts at planting, sprout damage at the time of planting and growing conditions. Accordingly, the authors stated that the number of stems per plant is influenced by variety. A research relieved by Subarta and Upadhya (1997) indicated that number of tubers per plot depends mainly on number of stems per plot, total number of stolons and stolons tuberized.

Results of the study also indicated that Gudene varieties performed significantly better than all other varieties in tuber weight per hill, total yield, marketable yield, dry mater content, specific gravity and starch content. The production of heavier tubers by Gudene could be due to the production of higher leaf area that favored higher dry matter production and accumulation in the tuber. Abubaker, *et al.,* (2011) reported that significant differences between varieties in tuber production per plant. Habtamu, *et al.,* (2016) who reported that Gudene variety was produced the highest average tuber weight which directly determine total tuber yield per hectare. Habtamu *et al*. (2016), Dash *et al.* (2018), Ebrahim *et al*. (2018) and Alemayehu *et al*. (2018) who reported that there is a significant difference of total tuber yield among potato varieties. In addition to this Addis *et al.,* (2017)reported the highest yield was recorded from Gudanie variety at Bule Hora District of Borena Zone. Similarly, Dembi and Basha (2017) reported that Gudenie yielded 26.69 t/ha on farm evaluation at Guji highlands of Oromia region. Solomon *et al.,* (2019) reported that a significant variation on the marketable tuber yield among potato varieties and lowest marketable yield was recorded from local landraces. Similarly, Yigzaw *et al.,* (2008) reported that local variety produced the lowest marketable tuber yield compared to all evaluated varieties. The low productivity of the local variety is related to its susceptibility to late blight. All varieties exhibited percent tuber dry matter of greater than 20% which is acceptable range for processing. Burton (1966) reported genetic differences among varieties in their ability to produce high solids when grown on the same test plot. The report of Tekalign and Hammes (2005a) also indicated that cultivars differed significantly with respect to total dry matter production. Kabira and Berga (2003) justified that potato tubers containing high dry matter of 20 - 24% produce fried products with high yields, less oil absorption and having better texture than those with lower solids. High dry matter has a direct effect on chips and French fries yield as the weight of the processed product depends directly on the amount of dry matter present per quantitative weight of fresh potatoes (Burton et al., 1992). The probable reason for such variation in specific gravity among the tested varieties could be attributed to variation in dry matter (total solid) contents of tubers. These results are in agreement with the suggestions of Beukema and Van der Zaag (1979) who reported that potato tuber specific gravity is influenced by a large number of factors, the most important ones being cultivar and environmental conditions. According to Kabira and Berga (2003), potatoes which have specific gravity value more than 1.080 are suitable for processing while tubers with specific gravity values less than 1.070 are generally unacceptable for processing. Hence, all varieties produced tubers with acceptable specific gravity values and are considered suitable for processing. The starch content plays very important roles in the quality of potato products and varies with potato cultivars. Potatoes with higher starch content are well suited for food use, processing or starch manufacture (Liu *et al.,* 2003).

Results of the study also showed that Local varieties performed significantly highest unmarketable tuber yield over other varieties. The variation in non-marketable yield of the varieties may be due to adaptability, crop maturity, and inherent ability of potato genotypes in producing unmarketable tubers per plant. The result is in agreement with Seifu and Betewulign *(*2017) whoreported that the highest unmarketable tuber yield was recorded from local variety. In addition to this Solomon *et al., (*2019) reported that more number of unmarketable tubers was found from local landraces.

**SUMMARY AND CONCLUSION**

Field experiment was conducted during 2019 and 2020 at Arba Minch University Gircha Highland Fruit and Vegetable Research Center, Southern Ethiopia (6°15′N 37°34′E), to evaluate the performance of potato varieties. Results from this trial have revealed that growth, yield and quality components of potato can be influenced by varieties. From the mean analysis, Gudene variety produced the highest total and marketable tuber yield than the rest improved varieties. Although certain variations observed across the years in tuber yield for different varieties, Gudene and Gera were showed high and consistent yield over years. Therefore, on the basis of present study Gudene variety, which was given high yield, could be used to increase production and productivity of the potato crop in the area for better improvement of food security and livelihood income. In the shortage of Gudene, Gera could be used, which was second high yielded variety.

**ACKNOWLEDGEMENTS**

The authors would like to thank Arba Minch University for funding the project. The authors also would like to thank Debere Brihan Agricultural Research Center for offering us the seed tubers of released Irish potato varieties.

# REFERANCE

Abubaker, S., AbuRayyan, A., Amre, A., Alzu’bil, Y. and Hadidi, N. 2011. Impact of Cultivar and Growing Season on Potato under Center Pivot Irrigation System. *World Journal of Agricultural Sciences*, **7**, 718-721.

Adane Hirpa, M.P.M. Meuwissen, A Tesfaye., W.J.M. Lommen, A.O. Lansink, A. Tsegaye and P.C. Struik, 2010. Analysis of Seed Potato Systems in Ethiopia.*American Potato Research Journal*. 87: 537-552.

Addis S, Dessalegn R, Wakene T. 2017. Irish Potato (Solanum Tuberosum) Variety Evaluation at Bule Hora District of Borena Zone. Global J Sci Front Res D Agric Vet 17: 2.

Agajie, T., G.Woldegiorgis,W. Kaguongo, B. Lemaga, and D. Nigussie. 2013. Adoption and impact of potato production technologies in Oromia and Amhara Regions. Paper presented at the national workshop on seed potato tuber production and dissemination, 12–14 March 2012, Bahir Dar, Ethiopia.

Alemayehu, T.G., Miilion, P.M. and Seman, A.S. 2018. Evaluation of Growth, Yield and Quality of Potato (*Solanum tuberosum* L.) Varieties at Bule, Southern Ethiopia. *Afri. J. Plant Sci.* 12(11): 277-283.

APHRD (Animal and Plant Health Regulatory Directorate). 2009. Crop variety register, Issue No. 12, June, 2009, Ministry of Agriculture and Rural Development, Addis Ababa, Ethiopia.

Berga Lemaga, G. Hailemariam and G. Woldegiorgis. 1994. Prospects of seed potato production in Ethiopia. pp. 254-275. In: E. Hareth, D. Lemma (ed.). Proceedings of the Second National Horticultural Workshop of Ethiopia.EARO-FAO, Addis Ababa, Ethiopia.

Beukema HP, Van der Zaag DE. 1979. Potato improvement, some factors and facts. International Agricultural Center, Wageningen, The Netherland. 323p.

Burton WG. 1966. The Potato; a Survey of Its History and of the Factors Influencing Its Yield, Nutritive Value, Quality and Storage. Veenmand and Sonen, N.V, Wageningen. 521p.

Burton WG, van Es A, Hartmans KJ. 1992. The physics and physiology of storage.. In P.M. Harris. The Potato Crop 3rd.ed; Chapman and Hall, London. pp. 608-727.

CIP (International Potato Centre). 2007. Procedures for standard evaluation of trials of advanced potato clones. An International Cooperators’ Guide. Lima, Peru: International Potato Centre.

Dash, S.N., Behera, S. and Pushpavathi, Y. 2018. Effect of Planting Dates and Varieties on Potato Yield. *Int. J. Curr.* *Microbiol. Appl. Sci.* 7(3): 1868-1873.

Dembi K, Basha K. 2017. On Farm Demonstration of Adapted Irish Potato (solanum tuberosum) in Highlands of Guji Zone, Oromia Region, Ethi­opia. Acad Res J Agric Sci Res 5: 514-20.

Ebrahim, S., Hussien, M. and Tewodros, A. 2018. Effects of seed tuber size on growth and yield performance of potato *(Solanum tuberosum* L*.)* varieties under field conditions*. Afri. J. Agricult. Res.* 13(39): 2077-2086.

Endale G, G. woldegeorgis and B. Lemaga, 2008. Potato seed management. pp. 53-78. In Root and tuber crops.*Ethiopian Institute of Agricultural Research*.

Gebremedhin woldegeorgis, E. Gebre and B. Lemaga, 2008. Potato variety development. pp. 15-32. In Root and tuber crops.*Ethiopian Institute of Agricultural Research.*

Gildemacher, P.R., W. Kaguongo, O. Ortiz, A. Tesfaye, W. Gebremedhin , W.W. Wagoire, R. Kakuhenzire, P.M. Kinyae, M. Nyongesa, P.C. Struik and C. Leeuwis, 2009. Improving Potato Production in Kenya, Uganda and Ethiopia: A System Diagnosis.*Potato Research* 52: 173-205.

Gould W. 1995. Specific gravity-its measurement and use. Chipping Potato Handbook.

Habtam S. 2012. Response of Potato (Solanum tuberosum L.) to the application of Phosphorus and Potassium fertilizers at Assosa, Benishangul Gumuz Regional State, Western Ethiopia. MSc. Thesis, Haramaya University, Ethiopia.

Habtamu, G., Wahassu, M. and Beneberu S. 2016. Evaluation of Potato (*Solanum tuberosum* L.) varieties for yield and yield components in eastern Ethiopia. *J.* *Biol. Agricult. Healthcare.* 6(5): 146-154.

Hirpa, A., M.P.M. Meuwissen, A. Tesfaye, W.J.M. Lommen, A. Oude Lansink, A. Tsegaye, and P.C. Struik. 2010. Analysis of seed potato systems in Ethiopia. American Journal of Potato Research 87: 537–552

Kabira J, Berga L. 2003. Potato Processing Quality Evaluation Procedures for Research and Food Industry Applications in East and Central Africa. Kenya Agric. Res. Inst. Nairobi, Kenya. 40p.

Liu, Q., Weber, E., Currie, V., Yada, R. 2003. Physico-chemical properties of starches during potato growth. Carbohydrate Polymer, 51: pp. 213-221.

Lung’aho C., Lemaga B., Nyongesa M., Gildermacher P., Kinyale P., Demo P. and Kabira J., 2007. Commercial seed potato production in eastern and central Africa. Kenya Agricultural Institute, Kenya. 140p.

Mesfin, M., G. Girmay, and F. Woldeyes. 2014. Enhancing household food security through Irish potato production in Gamo Highlands of Southern Ethiopia. Scholarly Journal of Agricultural Science 4: 410–419.

MOA (Ministry of Agriculture). 2013. Plant Variety Release, Protection and Seed Quality Control Directorate, Crop Variety Register Issue No.1 6, pp.161-164. , Addis Abeba, Ethiopia.

Morena DL, Guillen IA, Garcia LF. 1994. Yield development in potato as influenced by cultivars and the timing and level of nitrogen fertilizer. Am. Potato J., 71: 165-171.

Mulugeta G and DessalegnY. 2014. Genotype by Environment Interaction Analysis for Tuber Yield of Potato (*Solanumtuberosum*L.) Using a GGE Biplot Method in Amhara Region, Ethiopia.*Agricultural Sciences*, 5, 239-249.

SAS Institute. 2007. Statistical Analytical Systems SAS / STAT user’s guide version 9(1) caryNC :SAS institute inc.

Seifu F and Betewulign E. 2017. Evaluation of potato (Solanum tuberosum L.) varieties for yield attributes. Journal of Biology, Agriculture and Healthcare. 7(21): 15-22.

Singh TP, Singh KB. 1973. Association of grain yield and its components in segregations of green gram. Indi J Genetics 33: 112-17.

Solomon F, Asrat A. and Workie, A. 2019. Yield Performance of Potato (*Solanum tuberosum* L.) Varieties under Rainy Season at Wogera District, Northwestern Ethiopia. *J. Acad. Indus. Res*. 7(11): 144-149.

Subarta M. and Upadhya M.O. 1997. Potato production in western Bengal. *Environmental. Ecology Journal.*15: 646-900.

Talburt WF, Smith O. 1959. Potato processing. The AVI. Publishing Company, Inc. Westport.

Tekalign T, Hammes PS. 2005a. Growth and productivity of potato as influenced by cultivar and reproductive growth I, stomatal conductance, rate of transpiration, net photosynthesis and dry matter production and allocation. Scientia Horticulture J., 105: 13-27.

TekalignTsegaw. 2005. Response of potato to Paclobutrazol and Manipulation of Reproductive Growth under Tropical Conditions. A Ph.D. Dissertation presented to the department of production and soil science. University of Pretoria. 164p.

Waga M., Y. T. Gebresilase., R.P.O. Schulte., Paul C. Struik. 2016. The Analysis of Potato Farming Systems in Chencha, Ethiopia: Input, Output and Constraints. Am. J. Potato Res. 93:436–447

Yigzaw D, Fentahun M and Tesfaye A. 2008. Performance Stability Analysis of Potato Varieties under Rainfed and Irrigated Potato Production Systems in Northwestern Ethiopia. Eth.J.Sci & Technol. 5(2):90-98.

Yilma, S. 1991. The Potentials of True Potato Seed in Potato Production in Ethiopia.ActaeHorticultrae 270: 389-394.

**Figure 1:** Map of the study area.

**Table 1**: Description of released and local varieties

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| S.N | Varieties | Suitable Altitude (masl) | Released year | Breeder/Maintainer |
| 1 | Gudene | 1600-2800 | 2006 | Holetta Agricultural Research Center |
|  | Jalene | 1600-2800 | 2002 | Holetta Agricultural Research Center |
| 2 | Tolicha | 1600-3000 | 1997 | Holetta Agricultural Research Center |
| 6 | Gorebela | 2700-3200 | 2002 | Sheno Agricultural research center |
| 4 | Gera | 2700-3200 | 2003 | Sheno Agricultural Research Center |
| 5 | Local | - | local | - |

The source of all except the local cultivar was: MoA, 2013.

**Table 2**: Mean value of plant height, stem number per hill, tuber number per hill, tuber weight per hill and average tuber weight as affected by potato varieties over two year (2019 and 2020)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Variety | Plant height (cm) | Stem number per hill | Tuber number per hill | Tuber weight per hill(gm) | Average tuber weight (gm/tuber) |
| Gudene | 38.08c | 3.83c | 4.54cd | 335.12a | 57.12a |
| Jalene | 39.18bc | 5.86a | 4.95bc | 145.61d | 29.79cd |
| Tolicha | 47.22a | 3.82c | 3.86d | 173.58cd | 45.65b |
| Gorebela | 33.75d | 3.22c | 5.79b | 187.29c | 30.96cd |
| Gera | 29.33e | 4.01bc | 7.04a | 260.91b | 35.32c |
| Local | 42.83b | 5.09ab | 4.28cd | 153.81cd | 22.57d |
| LSD 5% | 4.12 | 1.11 | 1.05 | 41.58 | 8.99 |

Means followed by different letters in the same column are significantly different at 5% level of probability.

**Table 3:** Mean value of total yield, marketable yield, unmarketable yield, dry matter content, specific gravity and starch contents as affected by potato varieties over two year (2019 and 2020)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Variety | Total yield tuber (t/ha) | Marketable tuber yield (t/ha) | Unmarketable tuber yield (t/ha) | Dry Matter Content (%) | Specific Gravity (gcm-1) | Starch Contents (%) |
| Gudene | 28.74a | 27.05a | 1.69c | 37.23a | 1.155a | 28.88a |
| Jalene | 15.51cd | 12.98c | 2.53b | 23.79d | 1.095d | 16.62d |
| Tolicha | 16.79c | 14.35c | 2.45b | 31.15bc | 1.128bc | 24.34bc |
| Gorebela | 18.47c | 15.03c | 2.44b | 25.60d | 1.102d | 18.27d |
| Gera | 23.86b | 22.32b | 1.53c  | 34.09ab | 1.143ab | 26.02ab  |
| Local | 12.81d | 9.09d | 3.72a | 29.92c | 1.112c | 22.22c |
| LSD 5% | 3.55 | 3.62 | 0.70 | 3.16 | 0.015 | 2.88 |

Means followed by different letters in the same column are significantly different at 5% level of probability.