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Introduction
Despite enormous efforts to industrialize, Kenya still remains an agricultural nation with the majority of its people (75%) living in the rural areas and depending on agriculture. Small-scale farmers who constitute majority of the rural crop producers have great potential in increasing agricultural production. One of the general objectives of teaching agriculture in the 8–4–4 secondary school curriculum, is to ensure that schools take an active part in rural development by integrating agricultural activities in the curriculum.
This has been done through provision of technical knowledge, reinforcing interest in and awareness of opportunities existing in agriculture among the secondary school graduates.

This study focuses on the contribution of secondary school agricultural knowledge to rural agricultural productivity.
Little has been done to establish whether there is any significant difference in agricultural productivity between farmers who graduate with secondary school agriculture knowledge and those without.

The main question was, does agriculture knowledge at secondary school level make any difference in agricultural productivity?
The purpose of this paper is to examine and determine the contribution of secondary school agricultural knowledge to rural agricultural productivity.

Specifically, the paper seeks to determine the difference in crop productivity per unit area and the role of secondary school agriculture knowledge on the level of rural household food security.
Education experts have argued that, teaching of skills necessary for self-employment and self reliance is only possible where there are adequate and proper material and human resources.
The resources included a viable school farm among other equipment and facilities.

It is gratifying to note however that the teaching of agriculture has improved over the years to reflect the practical oriented approach.
Among the steps undertaken by the Kenya Government through the Ministry of Education, included ensuring that every school offering agriculture as an elective subject either own or have a farm for practical purposes as well as including project work (Agriculture practical paper) in the Kenya National Examinations where students fully participate in developing their psychomotor skills through carrying out of project work in their individual allocated plots.
The major aim is to reinforce the students interest in agriculture and development of the psychomotor skills so that they have positive attitudes towards the subject as well as developing their agricultural skills hence become better farmers after completing their formal education (K.I.E, 1992)
Little is however known about the impact of building this capacity among secondary school graduands in rural areas where crop production is carried out in Kenya.

The objectives of the study was to examine and determine the contribution of secondary school agricultural knowledge to rural agricultural productivity.

Specifically, the study sought to determine the differences in crop productivity per unit area and the role of secondary school agriculture knowledge on the level of rural household food security.
In Africa, several studies have shown a positive relationship between education and agricultural productivity (Mwangi, 1998; World Bank, 1980). These works elaborate on the positive contributions education makes to agricultural productivity. No significant growth is possible in Kenya without substantial growth in agricultural productivity (Nyoro, 1994).
Food security

• Food security can be defined as the ability of countries, regions or individuals to meet their year round target calorie food requirements through domestic production, storage and international trade or access to enough food by the people for active and healthy living. It is achieved when households produce enough staple crops for their own consumption or when they have enough disposable income to meet their food needs for the market. In general, a family has food security if it can consistently satisfy 80% or more of its nutritional requirements.
• Poor households especially those with smaller land holdings, and a weaker resource base are more vulnerable to food stress than wealthier households. Such households begin to suffer earlier than the rest, when food shortages occur Kagutha (1995).

• Poverty is a major cause of the inability of many individuals to acquire a calories adequate diet throughout the year. To be food secure, one needs a level of education that can enable him or her to be innovative and hence plant more, store more or purchase food for utilization (Dellere, 1988).
Materials and Methods

The research design chosen for the study was the *Ex-post facto* research design. This design allowed the researcher to examine the effects of the natural occurring influence of the independent variable (secondary school agriculture education) on the dependent variable (farmers’ agricultural productivity).

Each farmer was visited once to observe farm activities. An interview was conducted during the visit.
Sample Size and Sampling Procedures

First, the target population was identified and stratified according to the farmers’ secondary school agriculture knowledge.

Secondly, the sample size was determined by using proportionate sampling technique and thirdly, simple random sampling technique was applied for each strata.
Measures and Data Analysis

The responses from the respondents were coded and entered into a data sheet. The final data were then keyed into the computer for analysis.

The Statistical Package for Social Sciences (SPSS) programme was used to analyse the data. The t-test statistic was used to test the stated hypotheses.
Quantitative method of data analysis was mainly used with both descriptive and inferential statistics being employed to explain the results of the study. The dependent variables that were analyzed as follows:-

i. **Crop Productivity**
This variable was measured by determining the percentage of crop output per unit areas based on estimated agro-ecological zone potential productivity.
ii. Food Security – This was measured by dividing the variable into three categories indicating the level of household food security as follows:

a) Adequate food security
b) fair food security
c) poor food security
Results and Discussion
The purpose of this study was to determine the contribution of secondary school agricultural knowledge on rural agricultural productivity of small-scale farmers in Turbo and Kapseret division of Uasin Gishu County. The findings of the study are presented and discussed as follows:
Farmers’ Crop Production and Percentage Performance
The crops mainly considered to compute the percentage crop production performance were maize and beans.

Their productivity was measured by computing the output level of each crop per hectare compared with the average expected zone production and their percentage production performance determined.
The results in Table 1, indicate that farmers with secondary school agriculture knowledge with a mean percentage performance of 97.66 perform better as compared to the farmers without secondary school agriculture knowledge whose crop percentage performance 92.16.

The general observation and results from crop productivity as shown in Table 1 indicates that farmers with secondary school agriculture knowledge have a higher productivity in both crops.
Table 1  Distribution of Farmers by Overall Percentage Crop Performance

<table>
<thead>
<tr>
<th>Farmers with Sec. Scho. Agric. Knowledge</th>
<th>Farmers Without Sec. Sch. Agric. Knowledge</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percentage Performance</td>
<td>Frequency</td>
</tr>
<tr>
<td>&lt;50</td>
<td>5</td>
</tr>
<tr>
<td>50-100</td>
<td>51</td>
</tr>
<tr>
<td>&gt;100</td>
<td>42</td>
</tr>
<tr>
<td>Missing System</td>
<td>0</td>
</tr>
</tbody>
</table>

Mean = 97.66
Mean 92.16
First, this could be as result of specialization by this group of farmers as compared to the farmers without secondary school agriculture knowledge.

Secondly, better crop performance in crop productivity among the farmers with secondary school agriculture knowledge could be attributed to the knowledge gained in school in crop production to higher productivity.
Farmers Percentage Level of Food Security

The percentage level of food security per farmer was determined by noting down the amount of maize (as the main food crop) consumed per day for each of the farmers and also the amount of maize (in kgs) that the farmer kept for the family for the whole year.
Table 2: Farmers’ percentage level and food security

<table>
<thead>
<tr>
<th>Farmers with Sec. Sch. Agri. Knowledge</th>
<th>Farmers without sec. school, knowledge</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency</td>
<td>Percent</td>
</tr>
<tr>
<td>Cumulative Percent</td>
<td>Percent</td>
</tr>
<tr>
<td>&lt;49 (Lack Food Security)</td>
<td>1</td>
</tr>
<tr>
<td>50 – 79 (fairly Food secure)</td>
<td>14</td>
</tr>
<tr>
<td>&gt; 80 (Adequate Food security)</td>
<td>83</td>
</tr>
<tr>
<td>Mean = 140.57</td>
<td>Mean = 124.39</td>
</tr>
<tr>
<td>Total</td>
<td>98</td>
</tr>
</tbody>
</table>
The amount of food consumed per day per family is multiplied by 365 (days in a year). This gives the value of the amount of food required by a family for the whole year in kilograms.

The amount of food stored was compared to the amount consumed in a year and computed in percentages to determine the percentage level of food security per family. Their frequencies were determined and the summary was as shown on Table 2.
The results Table 2 show that only 1% of the farmers with secondary school agriculture knowledge lacked food security; whereas there was 3.9% of the farmers without secondary school agriculture knowledge who lacked food security.

Farmers with secondary school agriculture knowledge had 14.3% of them who were fairly food secure whereas their counterparts had 15.7%. Farmers with secondary school agriculture knowledge had 84.4% of the members with adequate food security.
The percentage mean level of food security was 140.57% for farmers with secondary school agriculture knowledge whereas those farmers without this knowledge had a percentage mean level of food security of 124.39 Impact of Secondary School Agriculture Knowledge on Crop Productivity.

It was postulated that there is no significant difference in crop productivity between farmers with secondary school agriculture knowledge and those without this knowledge. The inferential statistical analysis of the results yielded the t-test values presented on
Table 3: Paired t-test values on difference in crop productivity between farmers with secondary school agriculture knowledge and those without this knowledge

<table>
<thead>
<tr>
<th>Variable</th>
<th>df</th>
<th>Calculate t-value</th>
<th>Mean differences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percentages</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Crop yield (with agric)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Percentage</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Crop yield (without agric)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

|               |      | 20.078            | 97.65            | 97               | 0.05            |
This was done to test the validity of the hypothesis that there is no significant difference in crop productivity between farmers with secondary school agriculture knowledge and those without.

The results of the analysis on Table 3 show that there was statistically significant difference in crop productivity between farmers with secondary school agriculture knowledge and those without this knowledge.
Table 3 indicates that the t-calculated value of 20.078 for farmers with secondary school agriculture knowledge and those without it, with 97 degrees of freedom, was statistically different.

This difference is significant on the 0.05 level of significance. Therefore, the null hypothesis is rejected.
These findings imply that secondary school agriculture knowledge prepares the student to be better in agriculture productivity after going through the secondary school agriculture curriculum.

It can be concluded that the original objective of introducing agriculture in secondary schools in Kenya is being met.
Impact of Secondary School Agricultural Education on Household Food Security

It was hypothesized that there is no significant differences in level of household food security between farmers with secondary agriculture knowledge and those without this knowledge. This hypothesis was tested by use of $t$-test statistics.

The frequencies showing the percentage household-food security were also used to determine the relationship between the two variables as shown in the results yield by the $t$-test values presented on Table 4.
This was done to test the validity of the hypothesis that there is no significant differences in level of household food security between farmers with secondary school agriculture knowledge and those without it.

The results of the analysis in Table 4 show that there was statistically significant differences in the percentage level of food security between farmers with secondary school agriculture knowledge and farmers without this knowledge.
Table 4 indicate that the $t$-calculated values of 19.15 for farmers with secondary school agriculture knowledge and those without it. The results of the analysis on Table 4 show that there was statistically significant difference in the percentage level of food security between farmers with secondary school agriculture knowledge and farmers without this knowledge.

Table 4 indicate that the $t$-calculated values of 19.15 for farmers with secondary school agriculture knowledge and those without it, with 97 degrees of freedom show that the food security for the two groups of farmers were statistically different.
This difference was significant at 0.05 level. Therefore, the null hypothesis that stated that there is no significant differences in the level of household food security between farmers with secondary school agriculture knowledge and those without this knowledge was rejected.
Table 4: Paired t-test values on different in levels

<table>
<thead>
<tr>
<th>Variable</th>
<th>df</th>
<th>Calculate $t$-value</th>
<th>Mean differences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percentages</td>
<td>19.15</td>
<td>2.172</td>
<td>97</td>
</tr>
<tr>
<td>Level of Household Food security</td>
<td>0.05</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
These findings are consistent with the objectives of the secondary school agriculture syllabus (K.I.E, 1985).

It is expected that as a result of completing the four-year agriculture course, the learners are expected to develop self-reliance, resourcefulness and problem solving abilities, such as ensuring that they have enough food for the family throughout the year by planting enough and storing enough for the family.
CONCLUSIONS

The major purpose of this study was to determine the contribution of secondary school agriculture knowledge on rural agricultural productivity. In all the tests, farmers’ secondary school agricultural knowledge was the independent variable. The crop Productivity, and the level of household food security were the dependent variables.
Secondary School Agriculture Knowledge and Crop Productivity

It was concluded that the farmers’ secondary school agriculture knowledge positively contribute to the farmer’s crop percentage performance. In that, those farmers with secondary school agriculture knowledge perform significantly better than those without the secondary school agriculture knowledge. This implies that agriculture should be made more practical than before by emphasizing practical aspects to instill more knowledge in productivity among the learners, especially the development of the psychomotor skills.
Household Food Security

It was concluded that farmers with secondary school agricultural knowledge perform significantly better as compared to farmers without the secondary school agricultural knowledge as far as food security was concerned.
This implies that farmers with secondary school agricultural knowledge have developed the ability to be self-reliant, resourceful and problem solvers, such that they ensure they have enough food for the family throughout the year.

In general, agriculture knowledge at secondary school level, indeed contribute positively and significantly to rural agricultural productivity in Uasin Gishu County.
Policy Recommendations

On the basis of the results obtained, conclusions and implications of the study discussed above, the following recommendations are made:

Since farmers with secondary school agricultural knowledge perform significantly better in most of the aspects looked into in crop production, it would be more appropriate to make agriculture subject compulsory for all the students in this country as a way of diversifying ways of rural poverty alleviation.
It is therefore instructive to teachers, planners and even policy makers that teaching of agriculture in secondary schools develops self-reliance, resourcefulness, problem-solving abilities and occupies the learners in agricultural enterprises which may not necessarily require a lot of capital to start, but significantly improve the economy of this country.
The Ministry of Education, Science and Technology should also ensure that schools offering agriculture own or hire land to enhance the crop management practical skills.

This will ensure that those students completing the fourth form, having done agriculture in secondary school, become better farmers and hence agents of change in rural areas who can significantly contribute to poverty alleviation as it is a common knowledge in our country that agriculture is the backbone of Kenya’s economy.
THANK YOU