Effect of Weed Management Practices on Growth, Yield and Quality Parameters of Field Pea (*Pisum sativum* var. arvense)

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Abstract

Peas, which are classified as a significant winter vegetable in the leguminosae family, are highly susceptible to weed infestation. Weeds are plants which are deemed unwanted and have a negative impact on the effective utilization of land and water resources. Crop plants have decreased production due to competition with other plants for nutrients, moisture, and light resources. When weed control measures are not implemented effectively, there is a decrease in crop yields. The extent of this yield reduction is influenced by the specific weed species present and the overall abundance of weeds in the area. A research investigation was undertaken to examine the impact of different methods of weed management on the growth of plants, yield, and parameters contributing to yield in pea cultivation. The experiment was conducted using a randomized complete block design, with nine treatments that were replicated three times. In the 2022 - 2023 rabi season, the plots with black polythene mulch exhibited the earliest germination, with a mean duration of 5.33 days. This was followed by the control plots and hand weeding plots, which had a mean germination duration of 6.33 days. The black polythene sheet exhibited the following characteristics: the tallest plants (measuring 72.23 cm), number of leaves (83.83), fresh weight (78.66 g), dry weight per plant (19.83 g), number of primary branches per plant (34.00), chlorophyll index (48.03 SPAD), leaf area (28 cm²), number of pod per plant (42.00), pod length (10.06 cm), no of seeds per pod (9.33), seed weight per pod (9.36) and seed index (19.70 g). The implementation of black polythene sheet resulted in a notable augmentation in pod yield, reaching 2096.2667 kg ha⁻¹, which was substantially superior to the yields observed in all other treatments. The findings indicated that black polythene sheet and hand weeding was the most effective strategy in reducing weed density, as well as boosting growth, and yield metrics during both years.

Keywords

Sustainability, Hidden hunger, Weed management, Stale seed bed, Herbicides

Introduction

Vegetables are a crucial element of the cropping pattern as they are well-suited to various agricultural systems owing to their relatively shorter maturity period. Vegetable crops hold significant importance owing to their elevated yield potential, economic returns, nutritional value, and adaptability to small-scale agricultural operations. The plant species known as field pea, scientifically classified as *Pisum sativum* var. arvense, is a member of the botanical family Fabaceae, also referred to as leguminosae. The field pea has its origins in the mediterranean region of Southern Europe and Western Asia [1]. Field peas are considered to be a highly nutritious food source due to their substantial content of easily digestible protein, carbohydrates, minerals, and vitamins. The field pea possesses a
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Field pea is ranked as the third most widely cultivated pulse crop worldwide, following dry bean and chickpea [2]. The prominent states for pea cultivation are Uttar Pradesh, Madhya Pradesh, Jharkhand, Punjab, Himachal Pradesh, West Bengal, Haryana, Bihar, Uttar Pradesh, Orissa, and Karnataka. Pea cultivation in the Punjab region encompassed an expansive land area of 43.86 thousand hectares during the agricultural year of 2019-20. The average yield achieved per hectare amounted to 104.99 quintals, resulting in a total production of 460.45 thousand tons [3]. The presence of weeds within the crop leads to a reduction in both grain yield and quality. The extent of yield loss might range from little to substantial, throughout the entire post-emergence phase. Additionally, the presence of weeds can lead to a decrease in crop productivity due to their ability to compete with cultivated plants for essential resources such as light, moisture, nutrients, and space. Additionally, it is worth noting that weeds have the potential to serve as hosts for insect pests and diseases, thereby posing a threat to crop productivity. Late season weeds can pose a significant challenge by impeding harvest efficiency. Peas are known to be related to various forms of weeds. The extent of the issue pertaining to the presence of unwanted vegetation in agricultural crops is contingent upon the specific agro-ecological circumstances and the degree of control implemented. The field pea crop is commonly affected by various types of weeds, including Anagallis arvensis, Avena ludoviciana, Chenopodium album, Convolvulus arvensis, Cyperus rotundus, Fumaria parviflora, Galium aparine, Lepidium sativum, Medicago denticulata, Melilotus alba, Phalaris minor, Pea annua, Polygonum convolvulus, Rumex dentatus, Spergula arvensis, Stellaria media and Trigonella polycarpa [4]. Typically, farmers tend to overlook the impact of weed-related production losses and instead prioritize other cultural practices over weed control. The objective of weed management is to strategically alter the competitive balance in favor of the cultivated crop while maintaining undesirable weed growth at a controllable threshold, rather than seeking complete eradication of weeds [5]. Various weed management approaches can be employed, encompassing mechanical methods, cultural practices (such as hand weeding, hoeing, mulching, cover crops, crop rotation, and intercropping), as well as the application of chemical substances. Chemical weed management, shown using 2,4-D, is a highly successful approach for managing broadleaf weeds. This strategy significantly suppresses weed growth and facilitates enhanced crop output by ensuring efficient weed control. However, the overuse and indiscriminate application of herbicides can result in detrimental effects such as crop damage, potential risks to human health, contamination of soil and water, and the development of herbicide resistance. Due to the labor-intensive, time-consuming, expensive, and challenging nature of hand weeding and other weed control techniques, the utilization of chemicals emerges as a clear and cost-effective approach to weed management. Pre-emergence herbicides are often administered after the crop has been planted, but before the emergence of either the crops or the weeds. The utilization of pre-emergence herbicides provides the crop with a favorable beginning, as it effectively eradicates early weed competition. Nevertheless, there is a growing preference for non-chemical weed control among farmers who are increasingly seeking farming methods that are more sustainable and environmentally benign. According to the findings of Haliniarz et al. [6] it was observed that the use of black polythene and newspaper mulch demonstrated effectiveness and environmental friendliness in the context of sustainable weed management. The implementation of chemical control in conjunction with cultivation, rotation, and hand weeding has been shown to enhance crop yield. Black plastic mulch is widely recognized as the predominant choice among many types of plastic mulch [7]. With consideration of the detrimental impact of weeds, the objective of this study was to assess several methods of weed management (both cultural and chemical) in order to mitigate the negative consequences of weeds on pea production.

Materials and Method

A one-year study was undertaken to investigate the impact of various weed management strategies on the growth and yield of pea (P. sativum L.) at research farm of Agronomy at Lovely Professional University, Phagwara, during rabi season 2022 - 2023. The Punjab 89 variety was released by Punjab Agricultural University (PAU); Ludhiana was used as experimental material for this research. The tests were conducted using a randomized complete block design with nine treatments, each of which was replicated three times. The dimensions of the site were maintained at 5 m × 4 m. The treatments utilized in this study consisted of weedy check, stale seed bed, mulching through black polythene sheets, mulching through straw, eucalyptus mulch 10 - 12 t ha⁻¹, pendimethalin @0.75 kg ha⁻¹, propaquizafop 10% EC (post emergence) @ 500 – 700 ml ha⁻¹, hand weeding (20,40,60 DAS) and weed free. The land was adequately prepared, and the prescribed amounts of pre-emergence herbicides stomp was administered prior to the sowing of pea seeds in moist conditions within their designated plots. Propaquizafop 10% EC is herbicide applied after 25 DAS of the aryloxy phenoxy propanoic family. It is used for the post-emergence control of a wide range of annual and perennial grasses. It is a systemic herbicide, which is quickly absorbed by the leaves and translocated from the foliage to the growing points of the leaves and roots of the sprayed weeds. The herbicides were applied by a knap sack sprayer with flat fan nozzle using 500 L water per hectare. Additionally, both transparent and black plastic mulches were placed on their respective plots prior to sowing. In each replication, plots were established to conduct three hand weeding treatments at specific time intervals (20,40, and 60-days following sowing), as well as a control plot with unchecked weed growth. The soil of the experimental site was loamy sand in texture with pH 7.8. Recommended dose of fertilizers 20 kg of N, and 25 kg P₂O₅, per acre before sowing was applied at the time of land preparation. Stale seed bed where in which all the weeds are flushed out with khurpi and sickle and after 15 days seeds were sown there. All cultural practices, with the exception of weeding and hoeing, were consistently implemented over the duration of the research project. The study collected data on various variables including days taken to seed germination, plant height
(cm), number of leaves per plant, fresh weight per plant (gm), dry weight per plant (gm), number of primary branches per plant, chlorophyll content (SPAD), leaf area (cm$^2$), number of pods per plant, pod length (cm), no of seeds per pod, pod weight (gm), total green pod yield (kg ha$^{-1}$), seed index (gm), haulm yield (kg ha$^{-1}$), harvest index (%) were recorded at harvest. Plant height was taken from the ground level to the tip of the plant and the average of five plants was expressed as plant height in cm by using scale/measuring tape. Plants were selected from each plot and cut at the ground level. Immediately after cutting the plant fresh weight (g) of the plant samples was taken with the help of weighing balance.

Plant samples for dry matter studies were collected. These samples first air dried and then oven dried at 60 °C - 70 °C till a constant weight was obtained. The chlorophyll index was measured by using the SPAD meter. The leaf area was taken with the help of the leaf area meter. A fully developed plant was separated from five tagged plants in a net plot and were counted and the average was taken as the no. of pods per plant. From five tagged plant seeds were counted and observed and average of these five plants were noted and expressed at number of seeds per pod at the time of harvest. Seed samples from the produce of each treatment were taken as random and 100 seeds from these samples were counted and weighted and expressed as gm. Pods from each net plot according to the treatment were threshed, cleaned and the seed weight was recorded and yield per hectare was computed and expressed in kg/ha. Plants from the net plot after threshing were dried and their weight were recorded. From this stalk yield per hectare was calculated and expressed in kg/ha.

Statistical analysis

The standard statistical procedure was used for the statistical analysis of data. SPSS 22 vs. software was chosen for the analyses of variance, Pearson correlation, and the mean was compared using the least significant difference test at p ≤ 0.05.

Results and Discussion

Effect of weed management strategies on growth attributes of field pea

Days taken to germination and germination percentage

The number of days taken to seed germination was significantly affected by different weed management strategies, as reflected in figure 1. The earliest germination (4 days) took place in plots where black polythene sheet was laid out as mulch, followed by mulching through straw and weed free plots which took 5.7 days each. The seeds sown in plots applied with stomp 30 EC and dual gold 960 EC showed significantly delayed germination (7.5 days) which was statistically similar to control. The maximum number of days taken to germination was recorded in stale seed bed plots. Germination is the main contributing factor in yield. All the weed management practices showed significant variation in germination percentage. Superiority in germination (94%) recorded in mulching through black polythene sheets was practiced. Second highest germination (91.66%) recorded in hand weeded plots. Lowest germination percentage (37.66%) recorded in control plot. These results are in conformity with the findings of Jilani et al. [8].

Growth attributes

Plant height of pea was considerably (p < 0.05) affected by different weed management strategies (Table 1). The plants that exhibited the greatest height (72.23 cm) were observed in plots with black polythene sheet mulch. Following closely behind were plots that were free of weeds, with plants reaching a height of 71.4 cm. The manually weeded plots had plants that reached a height of 69.6 cm. Nevertheless, all of these treatments exhibited statistical similarity. The observed height of the plants in the black polythene mulch plots may be attributed to the absorption and retention of solar heat, resulting in an increase in soil temperature within the root zone. Pea plants generally exhibit heightened vigor and exhibit superior growth rates when cultivated in soil conditions characterized by higher temperatures. The provision of warmth facilitates expedited germination and root development, hence potentially augmenting plant height. The utilization of polythene mulch has been found to be effective in the conservation of soil moisture through the reduction of evaporation. The maintenance of regular soil moisture levels has been found to have a positive impact on plant growth, resulting in increased plant height. This is attributed to the essential role of sufficient water availability in supporting optimal plant development. The data indicated that plots that were free of weeds and manually weeded exhibited the highest plant height and overall health. This outcome can be attributed to the timely removal of weeds and the establishment of a favorable environment that promotes optimal plant growth. The findings presented here align with the previous conclusions drawn by Mathukia et al. [9] which indicated that the application of mulching shown efficacy in weed suppression and facilitation of plant growth. The control plot exhibited the lowest response in terms of plant height (37.67 cm), which was substantially different from all other treatments. Leaves serve as the primary location for the process of photosynthesis. There was considerable heterogeneity observed in the quantity of leaves across all weed management practices. The mulching technique of black polythene sheets resulted in the highest observed leaf count (83.83).
The reduced presence of weeds in the field pea plants’ environment enables them to capitalize on the availability of nutrients and water, hence allocating a greater proportion of resources towards vertical growth as opposed to engaging in resource competition with weeds. The plots that were free of weeds recorded the second greatest number of leaves, with a mean value of 81.66. The control plot had the lowest leaf count (40.33) as a result of heightened competition with weeds for essential resources like nutrients, light, and moisture. There was notable heterogeneity observed in leaf area across all weed management practices. The highest leaf area (28 cm²) was observed in the mulching treatment using black polythene sheets, which was statistically similar to the weed-free plots (27.6 cm²). The efficacy of mulching using straw and hand weeding were found to be comparable. According to the obtained results, various therapies exhibited statistically similar outcomes. The control plot exhibited the lowest observed leaf area, measuring 17.50 cm². The utilization of black polythene mulch results in the establishment of a thermally elevated microenvironment within the root zone, owing to its capacity to absorb and retain heat. The heightened temperature facilitates accelerated plant growth, hence potentially leading to the development of bigger foliage. Field peas exhibit robust growth in favorable climatic conditions, particularly in warm environments. Under ideal soil temperature conditions, these plants are capable of efficiently allocating a greater amount of energy and resources towards the development of their foliage. The utilization of black polythene mulch has been found to be a highly efficient method for preventing the growth of weeds. The reduction in weed presence results in decreased competition for essential resources such as nutrients, water, and sunshine, so enabling field pea plants to allocate a greater proportion of their resources towards the development of their foliage, consequently resulting in the growth of larger leaves. The same results were reported by Bhooshan and Singh [10] and Kristó et al. [11].

An increase in the number of leaves corresponds to a larger total leaf surface area. There was notable variance observed in the primary branches across all weed management practices. The mulching technique used black polythene sheet resulted in the highest observed increase in the primary branches, with a maximum increment of 34.00. The weed-free plots had the second highest primary branches (32.23) as documented. The control plot had the lowest reported number of primary branches, with an average of 11.66. The utilization of black polythene mulch serves as a highly efficient method for impeding the growth of weeds within the mulched region. By reducing the presence of weeds, field pea plants are able to dedicate a greater proportion of resources, such as nutrients, water, and sunlight, to branching and overall growth. Consequently, a greater number of branches may be observed on the pea plants. The same results were found by Devi and Singh [12] and Devi and Singh [13]. The reduction in weed presence results in an increased availability of nutrients for the field pea plants. The ample availability of nutrients can result in an increase in branching, as it provides the necessary resources for lateral plant growth. The mulching treatment using black polythene sheet resulted in the highest chlorophyll index, with a recorded value of 48.03 SPAD. Following closely after was the hand weeding treatment, which recorded a chlorophyll index of 47.63 SPAD. The control plot exhibited the lowest recorded value of 39.16 SPAD. The utilization of black polythene mulch has the dual purpose of inhibiting weed proliferation and enhancing light reflection onto the plants. Field pea plants derive advantages from increased light exposure, a critical factor for the process of photosynthesis. This biological process involves the absorption of light energy by chlorophyll, which is subsequently converted into chemical energy [14]. The application of mulch aids in the preservation of soil moisture through the reduction of evaporation and the prevention of weed competition for water resources. Maintaining consistent levels of soil moisture is crucial for the creation of chlorophyll and the process of photosynthesis. The highest recorded fresh and dry weight of plants (78.66 g and 19.83 g, respectively) was observed in the context of mulching using black polythene sheets. The control plot recorded the lowest values of 41.26 g and 11.43 g. The utilization of black polythene mulch serves as a highly efficient method for impeding the growth of weeds within the designated mulched region. The reduced presence of weeds in the field pea plants’ environment results in decreased competition for vital resources,
including sunlight, nutrients, water, and space. The decreased level of competition experienced by field pea plants enables them to commit a greater number of resources towards their growth and production, thereby leading to an augmentation in plant weight. The utilization of black polythene mulch contributes to effective weed management by establishing a conducive habitat for field pea plants, diminishing weed competition, and facilitating optimal growth circumstances. The combination of these elements collectively contributes to the increased accumulation of biomass in plants, leading to higher yields in the cultivation of field peas [15].

Effect of weed management practices on yield attributes of field pea

Table 2 demonstrates notable disparities observed across various weed control strategies in terms of parameters such as the number of pods per plant, pod length, seeds per pod, pod yield, and haulm yield. The highest number of pods per plant (42.00) was observed in plots where black polythene sheets were used for mulching, which was comparable to the number of pods per plant (41.66) in plots that were kept free of weeds. This was closely followed by the number of pods per plant (38.33) reported in plots where hand weeding was carried out. The control plot, in which no wedding was performed, exhibited the lowest reported number of pods, with a minimum count of 15.00. The utilization of black polythene mulch serves as a highly efficient method for impeding the growth of weeds within the designated mulched region. Field pea plants are able to spend a greater number of resources towards pod development when there is a reduced presence of competing weeds [15, 16]. The mitigation of weed competition facilitates increased pod production in plants. Mulch serves the purpose of conserving soil moisture through the mitigation of evaporation and the prevention of weed competition for water resources. Sufficient soil moisture levels are crucial for the development and expansion of pods. The maximum pod length (10.60 cm) was documented in the experimental plots where weed management was implemented through the use of black polythene sheets for mulching. The weed-free plots recorded the second largest pod length, measuring 9.48 cm. The control plot reported a minimum pod length of 7.34 cm. The highest reported weight of pods (9.36 g) was observed in plots where mulching was implemented using black polythene sheet, which was comparable to the weight of pods in plots that were manually weeded (8.60 g). The utilization of black polythene mulch contributes to effective weed management by establishing a conducive environment for the growth and development of field pea plants. The presence of this particular habitat results in a decrease in weed competition, enhances the availability of resources, and fosters conditions that facilitate the development of larger, heavier pods with increased length reported by Singh et al. [17]. As a result, the utilization of black polythene mulch as a weed management strategy has the potential to positively impact pod weight and pod length, hence increasing overall yields and improving productivity in the production of field peas. There was notable heterogeneity observed in the number of seeds per pod across all weed management practices. The highest recorded number of seeds per pod (9.33) was observed in plots where mulching was implemented using black polythene sheets, which was statistically comparable to the plots where hand weeding was conducted (8.66). The control plot recorded a minimum number of seeds per pod of 5.33 (Figure 2). The reduced presence of weeds facilitates increased nutrient accessibility for field pea plants within the soil. Enhanced nutrient availability is a crucial factor in facilitating the development of a greater number of seeds within each pod. The lack of weeds in the mulched plots can perhaps decrease the occurrence of pests and diseases that could potentially harm or impede the growth of seeds. Plants that are in good health have a higher probability of producing a greater number of seeds per pod. The highest recorded pod yield (2096.2667 kg ha⁻¹) was observed in the mulching treatment using black polythene sheets. This was followed by the weed-free plots, which had a pod yield of 2001.9667 kg ha⁻¹

Table 2: Effect of weed management practices on yield attributes of field pea.

<table>
<thead>
<tr>
<th>Treatments</th>
<th>No. of pods/plant</th>
<th>Pod length (cm)</th>
<th>No. of seeds/pod</th>
<th>Pod weight (gm)</th>
<th>Total green pod yield (kg ha⁻¹)</th>
<th>Seed index (%)</th>
<th>Haulm yield (kg ha⁻¹)</th>
<th>Harvest index (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weedy check (no weeding)</td>
<td>15.0 ± 0.8</td>
<td>7.3 ± 0.6</td>
<td>5.33 ± 0.47</td>
<td>4.8 ± 0.72</td>
<td>1031.90 ± 39.63</td>
<td>15.86 ± 0.78</td>
<td>1455.33 ± 91.82</td>
<td>41.52 ± 0.81</td>
</tr>
<tr>
<td>Stale seed bed</td>
<td>31.0 ± 0.8</td>
<td>5.5 ± 0.3</td>
<td>6.93 ± 0.09</td>
<td>7.2 ± 0.4</td>
<td>1718.93 ± 35.57</td>
<td>16.27 ± 0.21</td>
<td>2155.73 ± 57.67</td>
<td>44.37 ± 1.15</td>
</tr>
<tr>
<td>Mulching through black</td>
<td>42.0 ± 0.8</td>
<td>10.1 ± 0.4</td>
<td>9.33 ± 0.47</td>
<td>9.4 ± 0.6</td>
<td>2096.27 ± 31.73</td>
<td>19.70 ± 0.75</td>
<td>2605.63 ± 37.11</td>
<td>44.58 ± 0.33</td>
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<tr>
<td>polythene sheets</td>
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<tr>
<td>Mulching through local grass/</td>
<td>35.4 ± 2.2</td>
<td>8.2 ± 0.3</td>
<td>6.67 ± 0.47</td>
<td>6.1 ± 0.8</td>
<td>1935.80 ± 45.60</td>
<td>16.31 ± 0.36</td>
<td>2445.30 ± 15.63</td>
<td>44.18 ± 0.44</td>
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<tr>
<td>straw</td>
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<tr>
<td>Eucalyptus mulch 10 - 12 t ha⁻¹</td>
<td>36.3 ± 1.1</td>
<td>8.3 ± 0.7</td>
<td>6.33 ± 0.47</td>
<td>8.0 ± 0.3</td>
<td>1871.00 ± 41.97</td>
<td>16.33 ± 0.34</td>
<td>2310.2 ± 53.54</td>
<td>44.75 ± 0.91</td>
</tr>
<tr>
<td>Pendimethalin @0.75 kg ha⁻¹</td>
<td>33.3 ± 0.5</td>
<td>8.6 ± 0.1</td>
<td>6.33 ± 0.47</td>
<td>8.0 ± 0.4</td>
<td>1814.33 ± 25.07</td>
<td>16.03 ± 0.54</td>
<td>2113.73 ± 42.86</td>
<td>43.32 ± 0.75</td>
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<tr>
<td>(pre-emergence)</td>
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<tr>
<td>Propaquizafop 10% EC (post emergence) @ (500 - 700 ml/ha)</td>
<td>37.0 ± 0.8</td>
<td>8.1 ± 0.5</td>
<td>7.67 ± 0.47</td>
<td>7.7 ± 0.2</td>
<td>1732.37 ± 45.73</td>
<td>16.91 ± 0.47</td>
<td>2306.87 ± 55.02</td>
<td>42.89 ± 1.16</td>
</tr>
<tr>
<td>Hand weeding (20, 40, 60 DAS)</td>
<td>38.3 ± 0.5</td>
<td>9.9 ± 0.6</td>
<td>8.67 ± 0.47</td>
<td>8.6 ± 0.1</td>
<td>1964.37 ± 54.37</td>
<td>17.67 ± 0.87</td>
<td>2534.87 ± 53.91</td>
<td>43.66 ± 1.10</td>
</tr>
<tr>
<td>Weed free</td>
<td>41.7 ± 1.2</td>
<td>9.5 ± 0.2</td>
<td>8.33 ± 0.47</td>
<td>8.1 ± 0.4</td>
<td>2001.97 ± 5.48</td>
<td>18.84 ± 0.81</td>
<td>2559.63 ± 100.88</td>
<td>43.91 ± 0.92</td>
</tr>
</tbody>
</table>

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a value of 1455.33. The utilization of black polythene mulch serves as a highly efficient method for impeding the growth of weeds within the designated mulched region. The reduction in weed population leads to decreased competition for essential resources, including sunshine, nutrients, water, and space, hence enabling field pea plants to devote a greater proportion of these resources towards the production of pods. Consequently, this allocation results in an increased quantity of pods per plant. In the absence of weed interference, field pea plants demonstrate enhanced efficiency in the uptake of nutrients and water from the soil. Consequently, this phenomenon results in the development of more resilient and efficient plant species, which exhibit an enhanced capacity for pod production confirmed by Avola et al. [15] and Harker [18]. The seed index is a significant determinant of crop yield. There was notable variance observed in the seed index across all weed management practices. The study documented the maximum seed germination rate (19.70 g) during the process of mulching using black polythene sheets. The weed-free plots recorded a seed index of 18.84 g, which represents the second highest value observed. The control plot recorded the lowest value, which was 15.86 g. The application of mulch aids in the preservation of soil moisture through the reduction of evaporation and the prevention of weed competition for water resources. Sufficient soil moisture levels are crucial for the optimal development of seeds and the attainment of a higher seed index. The Harvest Index is a primary determinant of crop yield. There was notable variability observed in the harvest index across all the weed management practices. The highest harvest index (44.74%) was observed in plots where eucalyptus mulch was applied at a rate of 10-12 t ha⁻¹, which was statistically similar to the harvest index achieved through the use of black polythene sheets (44.58%). The control plot, where no mulching was applied, had the lowest harvest index value (41.52%). The practice of mulching has a significant role in the stabilization of soil temperature and moisture levels, hence mitigating the adverse effects of environmental stress on plants. Plants that experience less stress exhibit a tendency to dedicate a greater proportion of their resources towards the growth and development of sections that can be harvested, resulting in an increased harvest index confirmed by [12, 16].

**Correlation**

**Shown that correlation is statistically significant among themselves. There was negative correlation exist between the number of days to germinate with other growth parameters. There was a substantial positive association observed between the weed management practices applied in the experiment and the pod yield, pod number, seed per pod. Furthermore, it was observed that the mulching had a significant positive link with the haulm yield, pod yield, and seed index.**

**Conclusion**

The authors have reached the conclusion that various weed management techniques, such as cultural practices (e.g., hand weeding, stale seed bed, straw mulch, eucalyptus mulch, black plastic mulch) and chemical treatments (e.g., paraquat, stomp), have had a significant impact on the growth of plants, as well as the yield and yield-contributing characteristics of peas during the years of experimentation. All the herbicides, irrespective of mode of application i.e., pre-, or post-emergence reduced the weed density over control. The results of the study indicated that the practice of polythene mulching and hand weeding had a significant positive impact on the production of peas, as observed across the various treatments that were evaluated. It has been concluded that cultural method black polythene sheet and mechanical method- hand weeding has been recommended for weed control as compared to chemical method.

**Acknowledgements**

Author is thankful to Lovely Professional University, Phagwara, Punjab, India.

**Conflict of Interest**

None.

**References**


