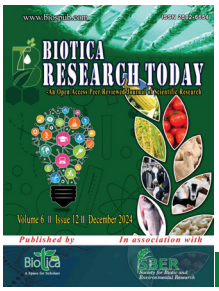
DOI: 10.54083/BioResToday/6.12.2024/490-494

Bio. Res. Today 2024, 6(12):490-494



Biotica Research Today

e-ISSN: 2582-6654

December, 2024

Article ID: RT1544 **Review Article**

Chemical Weed Management on Baby Corn (*Zea mays* L.): A Review

Suhrid Teli*, Abhijit Saha and Bobilan Debbarma

Dept. of Agronomy, College of Agriculture, Tripura, Lembucherra, West Tripura (799 210), India

Open Access

Corresponding Author

Suhrid Teli

: agrisuhrid@gmail.com

Conflict of interests: The author has declared that no conflict of interest exists.

How to cite this article?

Teli, S., Saha, A., Debbarma, B., 2024. Chemical Weed Management on Baby Corn (*Zea mays* L.): A Review. *Biotica Research Today* 6(12),490-494.

Abstract

Baby corn is plucked from the maize fields within 2 to 3 days of silk emergence, before fertilization begins. Baby corn offers diverse uses, including as a tasty vegetable, nutritious livestock feed and raw material for food processing. Its cultivation can boost profits, especially in peri-urban areas. This versatility makes it a valuable crop for farmers and food industries alike, promoting both economic viability and sustainability. In modern intensive farming, weed management is crucial due to heavy fertilizer and irrigation use. Weed infestation during the summer season results in a 40-50% reduction in baby corn yield and farmers suffer a greater financial loss when their crop yields are lost entirely. Reducing weed impact on baby corn requires considering weed type, competition duration and loss severity. A particular application of herbicides can't control all the community of weeds. The consensus among researchers highlights that using pre-emergence, post-emergence, or a combination of both through tank mixing is most effective for controlling weeds and increasing baby corn yield. These techniques optimize weed management effectiveness while drastically lowering weed dry weight. Herbicides applied before and after plant emergence initially reduce soil microorganism numbers. This disturbance in the soil ecosystem can affect nutrient cycling and soil health. Despite the initial decline, microbial populations can recover over time, adapting to herbicide presence or benefiting from reduced weed competition. However, regular use of similar herbicides can lead to herbicide resistance, so it's important to investigate new herbicide options.

Keywords: Herbicides, Herbicides resistant, Soil micro-flora, Weed flora

Introduction

Baby corn, a small, immature cob measuring 1-3 cm in silk length, is ideally harvested within 1-3 days after the silk first appears. It may be used as a vegetable in regular culinary preparations as well as for making special occasion dishes. Its crunchy texture and subtle sweetness make it a popular addition to dishes like stir-fries and salads. Beyond the plate, baby corn is a versatile ingredient in processed foods, lending its unique flavor to sauces, soups and snacks. Baby corn" has become popular in Indian cuisine due to its low calorie, high fiber, zinc and vitamin B_3 content. Urban consumers are adopting it in response to changing food preferences. Its short growth cycle fits well in intensive cropping systems and provides green fodder for cattle (Nazir *et al*., 2019). It is grown as a catch crop to utilize the barren land (the land lies between two main crops) in the summer season because baby corn is a short duration crop (need only 2 months) and needs a very small attention for farmers get some profit.

Since weeds are more suited to agro-ecosystems than agricultural plants, they compete with them for nutrients and different factors. In baby corn farming, spacing between plants is crucial. Wide gaps encourage weed growth, which competes with the crop for resources. This lowers photosynthesis, reduces dry matter production and hampers yield (Sivamurugan *et al*., 2017). Effective weed management is crucial for baby corn crops between one and four weeks after emergence. Weeds compete fiercely, potentially reducing yields by up to 50% if not managed promptly. Cultural practices, mechanical methods like hand-weeding, hoeing and mechanical cultivation, along with selective herbicides, are key tools for weed control. Traditional hand weeding is expensive and relies on available labour, which

Article History

RECEIVED on 01st April 2024 RECEIVED in revised form 13th December 2024 ACCEPTED in final form 20th December 2024

can be scarce. When hand weeding becomes costly, using herbicides becomes a competitive and effective alternative for weed control. It is suggested to use chemical weed control as a less labor-intensive and more cost-effective solution to this limitation. In the ongoing battle against weeds, the development of herbicides capable of effectively controlling a wide range of adversaries is crucial. These versatile herbicides are essential for tackling broad-leaved weeds, grasses and sedges. Most researchers agree that a combination of pre-emergence and post-emergence weed control methods, or a mix of both applied together, is the most effective for baby corn cultivation. This approach leads to decreased weed dry weight and better overall weed control, resulting in higher yields.

However, the soil microbial community is negatively impacted by the application of herbicides. In comparison to the soils treated with herbicides, Dutta *et al*. (2016), found in soil bacteria were significantly reduced in herbicide-treated plots compared to controls. While mechanical and chemical methods are common, herbicide use is rising due to cost and labour savings. Chemical weed control offers efficiency and cost-effectiveness, but concerns about environmental impact persist. Balancing effectiveness with sustainability is crucial for the future of baby corn cultivation. However, regular use of similar herbicides can lead to herbicide resistance, so it's important to investigate new herbicide options.

Weed Flora in Baby Corn

Abdullahi *et al*. (2016) recorded different weed species in research on various weed control management of maize fields with different doses of Atrazin chemical. The weed species are *Chenopodium album* L., *Cyperus rotundus* and *Cynodon dactylon*.

Stanzen *et al*. (2016) observed the different weed species in their experiment of maize and wheat cropping systems with different doses of Atrazine and Metribuzin chemicals. In grass weeds like *Phalaris minor* and *Poa annua* were notable and incase of broad-leaf weeds, *Circium arvense*, *Medicago denticulata* and *Anagallis arvensis*.

Swetha *et al*. (2015) experimented on various weed management at maize fields with different doses of Atrazine, Topramezone and Tembotrione chemicals. They noticed different weed species in maize field, grass species like *Rottboellia exaltata*, *Digitaria sanguinalis*, *Dactyloctenium aegyptium* and *Cynodon dactylon*, broad-leaved weeds like, *Trianthema portulacastrum*, *Amaranthus viridis* and *Parthenium hysterophorus* and sedge species like *Cyperus rotundus*.

Rajeshkumar *et al*. (2018) noticed the different weed species in their experiment intercropping of maize with cowpea and black gram along with different herbicides like Pendimethalin, Alachlor and Oxyfluorfen for weed management. The weed species located in the field are *Dactyloctenium aegyptium*, *Eleusine indica* and *Echinochloa colona* being prominent. *Cyperus rotundus* emerged as the dominant sedge species, while broad-leaves are, *Digera arvensis*, *Boerhaavia diffusa* and *Trianthema portulacastrum*.

Janak and Grichar (2016) have experimented weed control in maize fields with different herbicide chemicals like preemergence herbicides are Atrazine, S-Metolachlor, Mesotrione, Fluthiacet-methyl, Isoxaflutol, Alachlor, Pendimethalin, Acetochlor, Dimethenamid, Rimsulfuron, Saflufenacil and Bicyclopyrone. They noticed various weed species during experiments in the field such as *Acalypha ostryifolia*, *Amaranthus rudis*, *Echinochloa crusgalli*, *Amaranthus palmeri* and *Panicum fasciculatum*.

Sairam *et al*. (2023) examined the effectiveness of various pre- and post-emergence herbicides for weed control in maize fields; they observed that in *Echorncloa colona* comprised 31.48% of the total weed population, making it the most abundant monocot weed in terms of relative density (Figure 1). Following *Echorncloa colona*, other significant monocot weeds included *Commelina communis* at 11.48%, *Digitaria sanguinalis* at 11.37%, *Cyperus rotundus* at 10.31% and *Eleusine indica* at 7.79%.

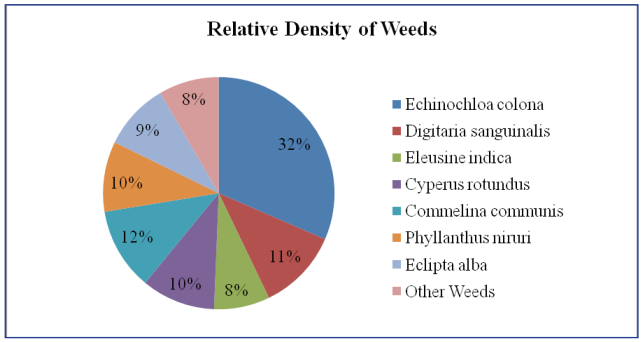


Figure 1: Relative density of weeds in weedy check at 30 and 60 DAS (Sairam *et al*., 2023)

In the spectrum of broad-leaved weeds, *Phyllanthus niruri* emerged as the predominant species, commanding 9.78% of the total weed population, closely trailed by *Eclipta alba* at 9.36%. Alongside these prominent species, minor weeds made their presence felt within the experiment, collectively contributing to the overall relative density of weeds observed.

Dutta *et al*. (2016) evaluated weed management in baby corn fields along with different doses of Atrazine and Metribuzin chemicals and straw mulch. They studied different weed species during experiments such as grassy weeds, including *Echinochloa* sp. L. and *Digitaria sanguinalis* L., comprised 30.1% of the total weed flora, sedges, represented by *Cyperus rotundus* L., accounted for 11.9%, broad-leaf weeds, such as, *Melilotus alba*, *Portulaca oleracea* L., *Alternanthera sessilis* L. and *Digera arvensis* L. constituted the majority at 57.8%.

Effect of Weed Management on Growth Parameter by Baby Corn

Nagdeve *et al*. (2014) studied the effect of weed control with different herbicides (glyphosate, atrazine and 2,4-D) on baby corn growth.

They noticed that applying spraying 2,4-D at 50 ppm on baby corn at 25 and 45 dates after sowing had positive effects (Figure 2). The use of 2, 4-D has shown to enhance plant growth, increase cob size and kernel number and boost yields of green cob and fodder than atrazine at 100 ppm and glyphosate at 5 ppm.

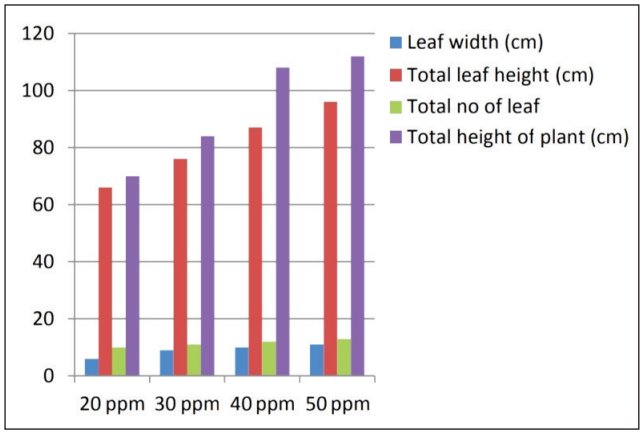


Figure 2: Growth effects of different concentration of 2,4-D (Nagdeve *et al*., 2014)

Dutta *et al*. (2016) noticed the different weed management in their experiment on baby corn growth along with different herbicides which they observed the application of Atrazine 2 kg ha^{-1} of the highest plant height (148.11 cm), leaf area index (3.48), than other chemicals treatment.

In a recent study by Sale *et al*. (2023), the growth of baby corn was compared in different chemicals herbicides applied. They observe that the application of Tembotrione 100 ml ha^{-1} such as the highest leaf area (336.43 cm), cob length (9.10 cm), cob weight (9.10 g) than other chemicals.

Effect of Weed Management on Yield Attributes by Baby Corn

Sale *et al*. (2023) studied on the different fertilizer combinations were tested for weed control and baby corn production, which through a unique blending 1.5 t ha^{-1} with 125% recommended nutrient dosage and adding tembotrione at 100 ml ha^{-1}, farmers achieve optimal weed control and yield (1.78 t ha^{-1}).

Dutta *et al*. (2016) did experiment weed management in baby corn fields during winter season with different herbicide chemicals. They noticed that the application of Atrazine 1kg ha^{-1} at 3 dates after sowing and 30 dates after sowing hand weeding is the highest yield (1.36 t ha^{-1}) and green fodder yield (35.31 t ha^{-1}) than other treatments.

Devi and Singh (2019) observed weed management practices on baby corn and field pea intercropping system which the application of pendimethalin 1 kg ha^{-1} is the greater yield (990 kg ha^{-1}) and stover yield (2,731 kg ha^{-1}) than other application.

Sairam *et al*. (2023) studied in weed management with different chemicals herbicides in maize field at Jabalpur Agriculture College, they observe that the post-emergence application of mesotrione 350 g ha^{-1} of the highest yield (2.44 t ha^{-1}) and stover yield (21.80 t ha^{-1}) than other chemicals treatment. In figure 3, the data reveals that the plot designated as the weedy check suffered the most substantial yield decrease, amounting to 50.22% and the lowest yield decrease at 12.62% for applied mesotrione 350 g ha^{-1} chemical herbicides such as play a crucial role in safeguarding crop yields.

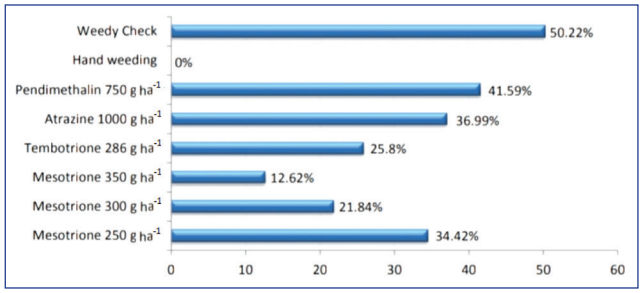


Figure 3: Effect of weed control treatments on yield reduction in maize (Sairam *et al*., 2023)

Effect of Different Chemical Weed Management on Baby Corn (*Zea mays* L.)

Nazir *et al*. (2019) experimented on weed management in baby corn fields during *kharif* season with different chemicals and mulching. The treatment was observed to have the highest weed control with Atrazine chemicals 1.5 kg ha^{-1} pre-emergence at 2 date after sowing.

Kebede *et al*. (2018) have conducted a research at Bako Agricultural Research Center, the effectiveness of Glyphosate and hand weeding in weed management for maize cultivation was investigated. They noticed the application of glyphosate chemicals 2 litres ha^{-1} at 40 dates after sowing of superior weed control.

Rani *et al*. (2020) found in a study conducted on weed management practices on maize in which spraying of Pre-emergence selective herbicides like Atrazine 1 kg ha^{-1} or Pendimethalin 1000 ml ha^{-1} is the standard weed control method for maize.

Sraw *et al*. (2016) did an experiment on integrated weed management of the maize field in *kharif* season with different herbicides and intercropping. They noticed that superior weed control with application of Atrazine 1.0 kg ha^{-1} at 30 dates after sowing.

Kakade *et al*. (2020) noticed that utilizing at 3 dates after sowing and 20 dates after sowing the application of herbicides in maize cultivation yielded superior weed management outcomes compared to conventional methods. They observed the highest weed control during applied Atrazine chemical 0.50 kg ha^{-1} at 3 dates after sowing and Tembotrione 0.120 kg ha^{-1} at 20 dates after sowing.

Sahoo *et al*. (2016) studied in weed management with different chemical herbicides in the maize field at Dharwad Agriculture College; they observed that the significant weed control efficiency with spraying post emergence of Atrazine 1 kg ha^{-1} with Glyphosate 2.5 kg ha^{-1}.

Singh *et al*. (2012) examined at Pantnagar during the rainy season in a maize field which they noticed that significantly weed control with spraying of Tembotrione 120 g ha^{-1} combined with a surfactant 1000 ml ha^{-1} than other chemicals treatment. This indicates that this specific combination achieved a maximum weed control efficiency (WCE) of 90%, effectively controlling both grassy and non-grassy weeds.

Reddy *et al*. (2012) conducted an experiment on weed management in zero-till maize fields after rice using various tank-mix chemical herbicides. They recorded the significantly highest weed control during the spraying tank mix of Atrazine 0.75 kg ha^{-1} and glyphosate 0.8 kg ha^{-1} at post emergence.

Effect of Weed Management on Economics by Baby Corn

Sivamurugan *et al*. (2017) conducted a field experiment in Coimbatore during *Kharif* season, weed management of different herbicides on growth and yield of maize. In their studies he has noticed the highest net return (Rs. 50,827.00 ha^{-1}) with the application of Pendimethalin 1 kg ha^{-1} and 2, 4-D 0.4 kg ha^{-1} 25 dates after sowing and benefit cost ratio (2.22).

Nazir *et al*. (2019) experimented on weed management during *kharif* season in baby corn with different chemicals. They found that the different treatment at 30 and 45 date after sowing of application Atrazine 1 kg ha^{-1} resulted in the best net profit of Rs. 91,760.00 and a (B:C ratio) of 1.54.

Dutta *et al*. (2016) studied in weed management with different chemicals herbicides in baby corn field at West Bengal, jaguli during winter season; they notice that the applied Atrazine 2 kg ha^{-1} at 3 dates after sowing of the highest benefit cost ratio 2.43 and net return Rs. 35,400.00 than other chemicals treatment.

Conclusion

Baby corn cultivation is known for its high productivity, superior quality and lucrative returns, particularly when employing effective weed control measures and judicious application of chemical herbicides within appropriate agro-climatic conditions. A variety of agronomic techniques have a major impact on baby corn's growth, yield and quality. Two to four weeks after baby corn is sown is considered the important period for weed competition in crops, with three to five weeks following sowing being the most critical. During this time, weed management methods should be applied to reduce losses and improve baby corn ability to use water and nutrients. Recent research highlights the crucial role of atrazine, either alone or in combination with other methods, in effectively managing weeds and increasing crop yields. Some studies have even suggested that atrazine not only aids in weed control but also plays a crucial role in augmenting the photosynthetic rate of baby corn plants. Interestingly, the application of pre-emergence (PE) herbicides did not impact the population of soil microorganisms - such as bacteria, fungi and actinomycetes - during maize harvest.

References

Abdullahi, S., Ghosh, G., Dawson, J., 2016. Effect of different weed control methods on growth and yield of Maize (*Zea mays* L.) under rainfed condition in Allahabad. *IOSR Journal of Agriculture and Veterinary Science (IOSR-JAVS)* 9(4), 44-47. DOI: https://doi.org/10.9790/2380-0904024447

Devi, M.T., Singh, V.K., 2019. Effect of planting pattern and weed management practices on weeds and yields of field pea and baby corn in field pea + baby corn intercropping system. *International Journal of Current Microbiology and Applied Sciences* 8(12), 1346-1362. DOI: https://doi.org/10.20546/ijcmas.2019.812.163.

Dutta, D., Thentu, T.L., Duttamudi, D., 2016. Effect of weed-management practices on weed flora, soil micro-flora and yield of baby corn (*Zea mays*). *Indian Journal of Agronomy* 61(2), 210-216. DOI: https://doi.org/10.59797/ija.v61i2.

Janak, T.W., Grichar, W.J., 2016. Weed control in corn (*Zea mays* L.) as influenced by preemergence herbicides. *International Journal of Agronomy* 2016, 2607671. DOI: https://doi.org/10.1155/2016/2607671.

Kakade, S.U., Deshmukh, J.P., Thakare, S.S., Solanke, M.S., 2020. Efficacy of pre- and post-emergence herbicides in maize. *Indian Journal of Weed Science* 52(2), 143-146. DOI: https://doi.org/10.5958/0974-8164.2020.00026.X.

Kebede, M., Bedada, G., Anbasa, F., 2018. Integration of glyphosates and hand weeding for weeds management in maize (*Zea mays* L.). *Agriculture Research and Technology: Open Access Journal* 18(5), 556075. DOI: https://doi.org/10.19080/ARTOAJ.2018.18.556075.

Nagdeve, D.P., Bharti, Y.P., Kumar, A., 2014. Efficacy of herbicides as plant growth regulator on productivity of maize with special aspect of baby corn. *International Journal of Medical Science and Clinical Invention* 1(6), 316-327.

Nazir, A., Bahar, F.A., Rashid, Z., Fayaz, S., Bhat, T.A., Khan, O.A., Sallim, M., Ahangar, T.A., 2019. Weed dynamics of Baby corn (*Zea mays* L.) as influenced by different weed management practices under the temperate conditions of Kashmir valley. *Bulletin of Environment, Pharmacology and Life Sciences* 8(7), 96-98.

Rajeshkumar, A., Venkataraman, N.S., Ramadass, S., 2018. Integrated weed management in maize-based intercropping systems. *Indian Journal of Weed Science* 50(1), 79-81. DOI: https://doi.org/10.5958/0974-8164.2018.00018.7.

Rani, B.S., Chandrika, V., Sagar, G.K., Reddy, G.P., 2020. Weed management practices in Maize (*Zea mays* L.): A review. *Agricultural Reviews* 41(4), 328-337. DOI: https://doi.org/10.18805/ag.R-1986.

Reddy, M.M., Padmaja, B., Veeranna, G., Reddy, D.V.V., 2012. Bio-efficacy and economics of herbicide mixtures in zero-till maize (*Zea mays*) grown after rice (*Oryza sativa*). *Indian Journal of Agronomy* 57(3), 255-258. DOI: https://doi.org/10.59797/ija.v57i3.4644.

Sahoo, T.R., Hulihalli, U.K., Paikaray, R.K, Mohapatra, U., Sethi, D., 2016. Saflufenacil: A new group of chemical herbicide for effective weed management in maize. *International Journal of Chemical Studies* 5(1), 339-342.

Sairam, G., Jha, A.K., Verma, B., Porwal, M., Sahu, M.P., Meshram, R.K., 2023. Effect of pre- and post-emergence herbicides on weed flora of Maize. *International Journal of Plant & Soil Science* 35(11), 68-76. DOI: https://doi.org/10.9734/IJPSS/2023/v35i112946.

Sale, M.N., Singh, G., Menon, S., Yomso, J., 2023. Influence of different sources of fertilizers and weed control treatments on growth, phenology and yield of Baby corn (*Zea mays* L.) in the Semi-arid region of India.

Journal of Applied Biology & Biotechnology 11(4), 77-83. DOI: https://doi.org/10.7324/JABB.2023.102093.

Singh, V.P., Guru, S.K., Kumar, A., Banga, A., Tripathi, N., 2012. Bioefficacy of tembotrione against mixed weed complex in maize. *Indian Journal of Weed Science* 44(1), 1-5.

Sivamurugan, A.P, Ravikesavan, R., Yuvaraja, A., Singh, A.K., Jat, S.L., 2017. Weed management in Maize with new herbicides. *Chemical Science Review and Letters* 6(22), 1054-1058.

Sraw, P.K., Kaur, A., Singh, K., 2016. Integrated weed management in *kharif* Maize at farmers field in Central Punjab. *International Journal of Agricultural Science and Research (IJASR)* 6(2), 97-100.

Stanzen, L., Kumar, A., Sharma, B.C., Puniya, R., Sharma, A., 2016. Weed dynamics and productivity under different tillage and weed-management practices in Maize (*Zea mays*)-Wheat (*Triticum aestivum*) cropping sequence. *Indian Journal of Agronomy* 61(4), 449-454. DOI: https://doi.org/10.59797/ija.v61i4.4411.

Swetha, K., Madhavi, M., Pratibha, G., Ramprakash, T., 2015. Weed management with new generation herbicides in Maize. *Indian Journal of Weed Science* 47(4), 432-433.