OPEN ACCESS
Scholars Bulletin
Abbreviated Key Title: Sch Bull
ISSN 2412-9771 (Print) |ISSN 2412-897X (Online)
Scholars Middle East Publishers, Dubai, United Arab Emirates
Journal homepage: https://saudijournals.com

Subject Category: Biology

# Review on Biological Impact of Seed-Dispersal with an Integrative Approach by Animals on Plant Distributions, Biochemical Composition and Future Perspectives

Neha Kainat[1], Muhammad Umair Dildar[1*], Muhammad Waqas Abbas[1], Haseeb Arshad[2], Muhammad Izhar[3], Talat Sabtain[4], Muhammad Waqar Akram[5]

[1]Department of, Plant Breeding and Genetics, University of agriculture Faisalabad, Pakistan
[2]Department of Social Sciences, University of agriculture Faisalabad, Pakistan
[3]Department of Zoology, Government College University, Faisalabad, Pakistan
[4]Department of Zoology, Wildlife and Fisheries, University of Agriculture, Faisalabad, Pakistan
[5]Department of Botany, Government Postgraduate College of Science, Samanabad, Faisalabad, Pakistan

**DOI:** 10.36348/sb.2021.v07i04.001 | **Received:** 27.01.2021 | **Accepted:** 11.02.2021 | **Published:** 05.04.2021

***Corresponding author:** Muhammad Umair Dildar

## Abstract

Most of the plants contain a variety of compounds that are principally active and work against the free radicals. Out of potentially active compounds in the medicinal plants, antioxidants are the most important of all the compounds. There are various flavonoids and antioxidants compounds that are actually possessing the chemical structure with the high stability. Seed biology is an intensive area of study, a reflection of the significance of seeds for several scientific areas. Animal mediated seed dispersal is important for sustaining biological diversity in forest ecosystems, particularly in the tropics. From an evolutionary perspective, the ability of plants to make seeds has conferred major selective advantages, accounting, in part, for the success of seed plants as the largest and most species rich group of land plants. It is important to remove the free radicals that are produced biochemically in the specific organ in order to keep as well as minimize the effects produced by the free radicals. The antioxidants possess certain properties that differentiated them to the other chemical compounds. Animals that are highly vagile are considered to be the most efficient at active dispersal. Highly vagile animals include many species of birds, bats, and large insects. Large aquatic animals are effective dispersers, and some terrestrial animals can disperse large distances on foot. Seed sensitivity to nitrate is affected by other environmental factors, such as light and after-ripening, and by genotypes. Biochemical eptides are the several types of the peptides that are found in the inner portion of the onions. These peptides are gamma-glutamyl-methionine, gamma-glutamyl-isoleucine, gamma-glutamyl-leucine and gamma-glutamyl-valine.

**Keywords**: Seed Biology, Crops, Animals, Animal ecology, Animal diversity.



## INTRODUCTION

Most plants contain a variety of compounds that are principally active and work against the free radicals [1]. Out of potentially active compounds in the medicinal plants, antioxidants are the most important of all the compounds. The power of the oxidizing to the oxidants greatly enhanced by the presence of a lot antioxidants which are most important and responsible for the scavenging the chemicals with high power of to convert them to the less or smaller substances that effectively removed from the body with no damage to the major parts of the body such as liver as well as kidneys [2, 3]. It is important to remove the free radicals that are produced biochemically in the specific organ in order to keep as well as minimize the effects produced by the free radicals. The antioxidants posses certain properties that differentiated them to the other chemical compounds [4].

Seed sensitivity to nitrate is affected by other environmental factors, such as light and after-ripening, and by genotypes. Mode of nitrate action in seed germination has been well documented in Arabidopsis thaliana and the hedge mustard Sisymbrium officinale. In these species nitrate promotes seed germination independent of its assimilation by NR, suggesting that it

acts as a signal to stimulate germination. In Arabidopsis, maternally applied nitrate affects the degree of primary dormancy in both wild-type and mutants defective in NR. This indicates that nitrate acts not only during germination, but also during seed development to negatively regulate primary dormancy [5].

A wide range of nitrate transceptors in plants results from their evolution under varying nitrate availability. The molecular mechanisms of seed responses to environmental signals, such as light and temperature, have been well characterized Another signal, which is critical for seeds to sense surrounding environments for germination, is the soil components. Nitrate is a major signal in the soil environment for seeds to detect vegetation gaps and germinate in the desirable spots with the likelihood of successful seedling establishment [6, 7].

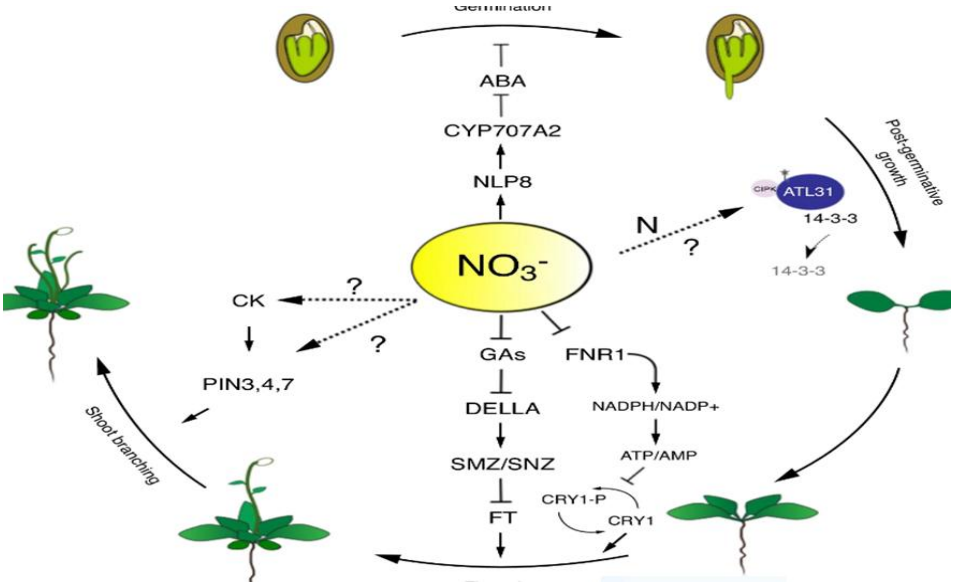


**Fig-1:Shows the mecahnism of nitrate signaling affecting the seeds dispersal**

**Consequences of Seed Dispersal in Plants and Animals**

Animals that are highly vagile are considered to be the most efficient at active dispersal. Highly vagile animals include many species of birds, bats, and large insects. The Monarch butterfly (Danaus plexippus) is a notable example of a highly vagile insect capable of flying hundreds to thousands of kilometers. Other animals, which cannot fly, are also considered highly vagile [8].

Large aquatic animals are effective dispersers, and some terrestrial animals can disperse large distances on foot. As a result, highly vagile organisms have the greatest capacity for long-distance dispersal. Despite the intrinsic vagility of a species, the extent of dispersal is linked to restrictions imposed by the habitat. Flying animals are less affected by habitat changes because they can bypass barriers by flying over or around them [9].

Snails disperse the small seeds of a very few plant species (e.g., Adoxa). Earthworms are more important as seed dispersers. Many intact fruits and seeds can serve as fish bait, those of Sonneratia, for example, for the catfish Arius maculatus. Certain Amazon River fishes react positively to the audible "explosions" of the ripe fruits of Eperua rubiginosa. Fossil evidence indicates that saurochory is very ancient. The giant Galapagos tortoise is important for the dispersal of local cacti and tomatoes [10, 11].

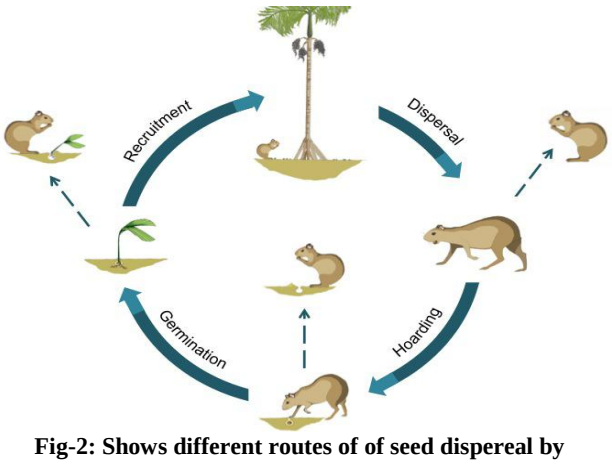


**Fig-2: Shows different routes of of seed dispereal by animals**

**Biochemical properties seedling dispersal**

There are various flavonoids compounds that are actually possessing the chemical structure with the high stability. The presence of these compounds in the inner as well as the outer portion of the medicinal plants significantly reduces the risks of the diseases such the cancer, diabetes and other diseases associated with the

metabolism. If any of the compound is lacking that makes the composition as well as the potential role in treating the diseases, then the activity of the specific compound also leads to the occurrence of the specific disease. These compounds are alliinase, peptides, saponins, sulphur compounds that make the actual composition of the onion. Sulphur compounds categorized on the basis of volatility. These are volatile sulphur compounds and others are non-volatile compounds. Flavonoids compounds that responsible for bioactivities against the various diseases such cancer, diabetes and liver diseases. There are the three main types of flavonoids such as kaempferol**,** quercetin and anthocyanins [12-14].

**Table-1: General chemical composition of the seedling plant**

| **Parameter** | **Approx. value** |
|---|---|
| Biomolecules | g/100g seedling plant |
| Lipids | 0.6 |
| Proteins | 1.6 |
| Carbohydrates | 12 |
| Elements | mg/100g seedling plant |
| Calcium | 550 |
| Potassium | 100 |
| Phosphorus | 450 |
| Sodium | 50 |
| Magnesium | 100 |
| Iron | 3 |
| Aluminium | 1 |
| Vitamins | mg/100g seedling plant |
| Thiamin | 0.5 |
| Nicotinic acid | 0.6 |
| Vitamins | µg /100g seedling plant |
| Folic acid | 15 |
| Retinol | 20 |
| Biotin | 0.8 |

Alliinase is the major type of the protein that is found in the inner as well as the outer portion of the onions. Its main functions to carry the reactions between the cysteine and alliin to give the allicin that is important to give the special properties to the onions such as smell as well as tears. This type of the protein bears the molecular weight 50 kDa. The tears due to the onions majorly associated with the alliinase [15].

**Nature of Biochemical Peptides**

Peptides are the several types of the peptides that are found in the inner portion of the onions. These peptides are involved mainly in the storage of the inner components of the onions that are usually the food part of the onions such as gamma-glutamyl-methionine, gamma-glutamyl-isoleucine, gamma-glutamyl-leucine and gamma-glutamyl-valine. The blood that was under investigation optimize by placing them in incubator for about forty minutes at temperature 37ºC that was maintained the temperature of blood. Blood samples were taken from the healthy individuals. When the process of incubation occurs at certain conditions, then blood was undergo a change called clot formation that was happens in the centrifuge tubes. These tubes were properly filled and put into the strand with right position. All precautionary measures were made during this experiment. When the incubation started after 30 minutes, then clot formation occurred and principally optimized. Clots formed in the samples of blood in the micro centrifuge tubes. Serum was removed and clot will be weighed systematically and calculated in the form of percentage [16-18].

Sulphur compounds are categorized on the basis of element at the specific position of the particular amino acid. The first amino is the cysteine that possess the sulphur at the end of the chain and second of the amino acid is the methionine. These amino acids also reduce the potential risks of the diseases associated with the metabolism. If there is lack of this element in the form sulphur at the specific position, then ultimately amino acids fails to give its function in the body and excess of these amino acids leads to the toxicity [19, 20].

Volatile sulphur and other related compound are included in the compounds that possess the property of the volatility. These are the methionine as well as the cysteine. These amino acids in inner portion of the onions catalyzed the reactions of the volatility. If there are the high concentrations of the theses amino acids, there is the increases of the volatility of the compounds present in the onions [21].

Radical scavenging activity of onion extracts actually measure relative to the DPPH radical. The scavenging activity measure when there reduce in the absorbance of extract samples in relationship with standard solution of DPPH. Inhibition of the DPPH free radical finally evaluated in the form of percentage [22, 23]. DPPH solutions are uses to find out the inhibition activity in this experiment that was calculated as given formula below and explained in later paragraph.

$$I(\%) = 100 \times (A_{blank} - A_{sample} / A_{blank})$$

I(%) stands percentage inhibition of the chemical compound of DPPH free radical. A blank is represented to the absorbance of the control mixture and no chemical compound added or excluding from it. In this equation, A sample is represented to the absorbance of the chemical compound under investigation or test compound. The scavenging activity was determined in the form of percentage in the above formula explained in equation.

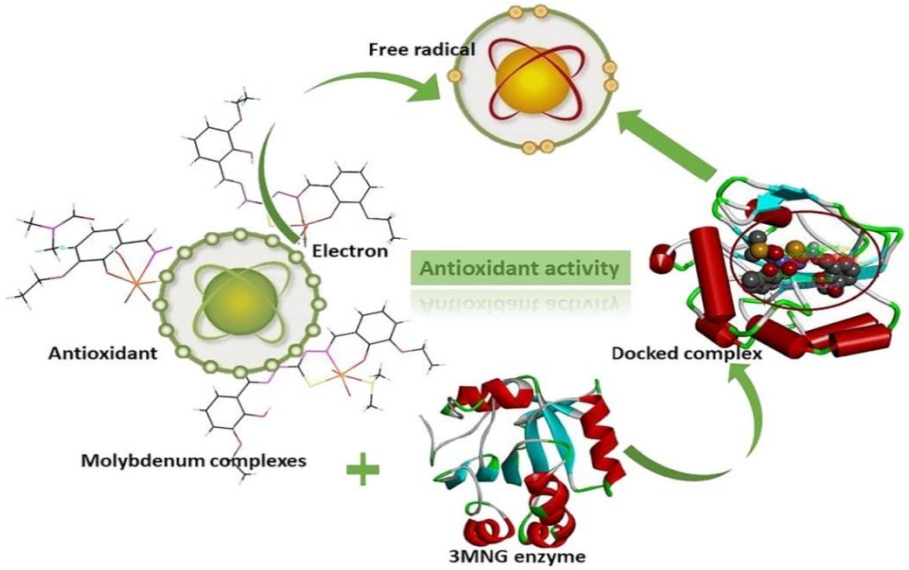


**Fig-3: Shows the difftrent steps of moelcular decetion of seed antoxidants activity**

**Non-volatile compounds**

Non-volatile are the several compounds that have no property of volatility. These compounds possess the sulphur with especially attached with the thio group compounds to form the thiosulphides monothiosulphides [24-27]. If there the high concentrations of the these thiosulphides that also causes the severe type of the damage to the different organs such the liver as well as kidney also damage due to high level of the sulphur. The important steps kept important that blood was stored by supplying the proper temperature [28, 29].

## CONCLUSION

Seed biology is an intensive area of study, a reflection of the significance of seeds for several scientific areas. From an evolutionary perspective, the ability of plants to make seeds has conferred major selective advantages, accounting, in part, for the success of seed plants as the largest and most species- rich group of land plants. Animal- mediated seed dispersal is important for sustaining biological diversity in forest ecosystems, particularly in the tropics.

## REFERENCES

1. Shahid, A., Ali, S., Zahra, T., Raza, M., Shahid, A., Saeed, M. U., & Javaid, F. (2020). Influence of Microbes in Progression of Cancer and DNA Damaging Effects. Haya: The Saudi Journal of Life Sciences.
2. Valido, A., & Olesen, J. M. (2019). Frugivory and seed dispersal by lizards: a global review. Frontiers in Ecology and Evolution, 7, 49.
3. Snell, R. S., Beckman, N. G., Fricke, E., Loiselle, B. A., Carvalho, C. S., Jones, L. R., ... & Schupp, E. W. (2019). Consequences of intraspecific variation in seed dispersal for plant demography, communities, evolution and global change. AoB Plants, 11(4), plz016.
4. Johnson, J. S., Cantrell, R. S., Cosner, C., Hartig, F., Hastings, A., Rogers, H. S., ... & Pufal, G. (2019). Rapid changes in seed dispersal traits may modify plant responses to global change. AoB Plants, 11(3), plz020.
5. Iftikhar, A., Shahid, A., Shah, S. S., Ali, S., Raza, M., Ali, E., & Umbreen, S. Antimicrobial Activities of Selected Medicinal Plant with Potential Role of Chemical Compounds.
6. Qamar, M., Mustafa, G. A., Tariq, S., Rafeeq, H., Rafiq, M., Naqvi, W. Z., ... & Kanwal, T. (2020). Novel Methods for Detection of Biological Samples, Current Direction and Future Perspectives.
7. Naeem, M., Hayat, M., Qamar, S. A., Mehmood, T., Munir, A., Ahmad, G., ... & Hussain, A. (2019). Risk factors, genetic mutations and prevention of breast cancer. Int. J. Biosci, 14(4), 492-496.
8. Rehm, E., Fricke, E., Bender, J., Savidge, J., & Rogers, H. (2019). Animal movement drives variation in seed dispersal distance in a plant–animal network. Proceedings of the Royal Society B, 286(1894), 20182007.
9. Kleyheeg, E., Fiedler, W., Safi, K., Waldenström, J., Wikelski, M., & van Toor, M. L. (2019). A comprehensive model for the quantitative estimation of seed dispersal by migratory mallards. Frontiers in Ecology and Evolution, 7, 40.
10. Shafiq, S., Adeel, M., Raza, H., Iqbal, R., Ahmad, Z., Naeem, M., ... & Azmi, U. R. (2019). Effects of Foliar Application of Selenium in Maize (Zea Mays L.) under Cadmium Toxicity. In Biological Forum-An International Journal, 11(2), 27-37.
11. Ahmad, I., Khan, S., Naeem, M., Hayat, M., Azmi, U. R., Ahmed, S., ... & Irfan, M. (2019). Molecular Identification of Ten Palm Species

using DNA Fingerprinting. Int. J. Pure App. Biosci, 7(1), 46-51.
12. Usman, G., Muhammad, N., Hamza, R., Usman, I., Ayesha, A., Saqib, U., ... & Fatima, Q. (2019). A Novel Approach towards Nutraceuticals and Biomedical Applications. Scholars International Journal of Biochemistry, 2(10), 245-252.
13. Tahir, M. F., Ali, S., Noman, M., & Goher, M. (2020). A Novel Approach towards the Potential Effects of Chlorpyrifos on Testicular Biochemistry and Physiology of Male Sprague Dawely Rats.
14. Naeem, M., Ali, J., Hassan, M. Z., Arshad, B., Rao, M. H. I., Sarmad, M. S. K., ... & Hassan, M. U. (2019). Novel Approach towards DNA Barcoding as a Tool in Molecular Biologyand Biological Activities of Cyclotides with Particular Emphasizes at Molecular Level. In Biological Forum-An International Journal, 11(2), 83-96.
15. Naeem, A., Saddique, S., & Chand, S. A. (2019). Advancement and Future Directions towards Herbal Treatment for Various Diseases.
16. Camargo, P. H., Pizo, M. A., Brancalion, P. H., & Carlo, T. A. (2020). Fruit traits of pioneer trees structure seed dispersal across distances on tropical deforested landscapes: Implications for restoration. Journal of Applied Ecology, 57(12), 2329-2339.
17. Naeem, M., Ashraf, A., Safdar, H. M. Z., Khan, M. Q., Rehman, S. U., Iqbal, R., & Ahmad, G. (2020). Biochemical changes in patients with chronic kidney failure in relation to complete blood count and anemia. IJB, 16(1), 267-271
18. Consolo, G., & Valenti, G. (2019). Secondary seed dispersal in the Klausmeier model of vegetation for sloped semi-arid environments. Ecological modelling, 402, 66-75.
19. Spennemann, D. H. (2020). Frugivory and seed dispersal revisited: Codifying the plant-centred net benefit of animal-mediated interactions. Flora, 263, 151534.
20. Naeem, M., Hussain, A., Azmi, U. R., Maqsood, S., Imtiaz, U., Ali, H., ... & Ghani, U. (2019). Comparative Anatomical Studies of Epidermis with Different Stomatal Patterns in Some Selected Plants Using Compound Light Microscopy. International Journal of Scientific and Research Publications, 9(10), 375-380.
21. Ahsan, M., Aslam, M., Akhtar, M. A., Azmi, U. R., Naeem, M., Murtaza, G., ... & Shafiq, S. (2019). Effect of inoculation of three rhizobial strains on maize hybrids. Journal of Biodiversity and Environmental Sciences, 14(6), 168-177.
22. Hazafa, A., Batool, A., Ahmad, S., Amjad, M., Chaudhry, S. N., Asad, J., ... & Ghani, U. (2020). Humanin: A mitochondrial-derived peptide in the treatment of apoptosis-related diseases. Life Sciences, Volume 264, 2021, 118679.
23. Khan, S., Abbas, A., Ali, I., Arshad, R., Tareen, M. B. K., & Shah, M. I. (2019). Prevalence of overweight and obesity and lifestyle assessment among school–going children of Multan, Pakistan.
24. Rafeeq, H., Ahmad, S., Tareen, M. B. K., Shahzad, K. A., Bashir, A., Jabeen, R., ... & Shehzadi, I. (2020). Biochemistry of Fat Soluble Vitamins, Sources, Biochemical Functions and Toxicity.
25. Ghani, U., Naeem, M. Bukhari, S. S. H., Yar, G., Tariq, I., Siddique, S., Nawaz, H. A., Pal, Z. A. A., Nasim, F., & Bukhari, S. A. H. (2019). Prevalence and Risk Factors associated with Hepatitis B and Hepatitis C and their Correlation with Inflammatory Markers among Southern Region of Punjab. Biological Forum - An International Journal, 11(2): 136-143.
26. Khan, S., Zelle Rubab, S. H., Abbas, A., Arshad, R., & Tareen, M. B. K. Hematological profile of children with severe acute malnutrition at the Tertiary care hospital in Multan.
27. Muhammad, N., Umair, R. A., Sarmad, A. Q., Ahmad, M., Tariq, M., & Muhammad, A. F. (2019). Reliable vaccine production by using Risk Based Bioengineering Strategies. 6th International Conference on "Sustainable Agriculture in Changing Climate: Strategies and Management. 261.
28. Bennett, J. J., & Sherratt, J. A. (2019). Long-distance seed dispersal affects the resilience of banded vegetation patterns in semi-deserts. Journal of theoretical biology, 481, 151-161.
29. Pedrosa, F., Bercê, W., Levi, T., Pires, M., & Galetti, M. (2019). Seed dispersal effectiveness by a large- bodied invasive species in defaunated landscapes. Biotropica, 51(6), 862-873.