What is claimed is:

1. A fusion protein comprising in the N-terminus to C-terminus direction a heterologous domain, a first linker sequence, and a Type V CRISPR-Cas enzyme, wherein the first linker sequence comprises a repeated GGGGS sequence, wherein the fusion protein comprises a sequence selected from the group consisting of SEQ ID NO: 17, SEQ ID NO: 24, SEQ ID NO: 35, SEQ ID NO: 39, SEQ ID NO: 43, SEQ ID NO: 50, SEQ ID NO: 52, SEQ ID NO: 54, SEQ ID NO: 56, SEQ ID NO: 81, SEQ ID NO: 85, SEQ ID NO:87, and SEQ ID NO:89.

2. The fusion protein of claim 1, wherein the heterologous domain is a deaminase, polymerase, nuclease, relaxase, alkyltransferase, methyltransferase, adenosine deaminase, cytidine deaminase, oxidase, thymine alkyltransferase, adenine oxidase, adenosine methyltransferase, glycosylase or nuclear localization signal.

3. The fusion protein of claim 2, wherein the heterologous domain is a deaminase domain.

4. The fusion protein of claim 3, wherein the deaminase domain is a cytidine deaminase.

5. The fusion protein of claim 4, wherein the cytidine deaminase domain is an activation-induced cytidine deaminase ("AID").

6. The fusion protein of claim 4, wherein the cytidine deaminase domain is an apolipoprotein B mRNA-editing complex ("APOBEC") domain.

7. The fusion protein of claim 6, wherein the APOBEC domain is an APOBEC1 family deaminase.

8. The fusion protein of claim 7, wherein the APOBEC domain comprises a sequence at least 70% identical to SEQ ID NO: 1.

9. The fusion protein of claim 3, wherein the deaminase domain is an adenine deaminase.

10. The fusion protein of claim 9, wherein the adenine deaminase is a TadA domain.

11. The fusion protein of claim 10, wherein the TadA domain comprises a sequence at least 70% identical to SEQ ID NO: 92.

12. The fusion protein of claim 1, wherein the type V CRISPR-Cas enzyme is a type V-A (Cas12a) enzyme.

13. The fusion protein of claim 12, wherein the Cas12a domain is selected from the group comprised of SEQ ID NO: 3, SEQ ID NO: 6, SEQ ID NO: 22, SEQ ID NO: 45, SEQ ID NO: 46, SEQ ID NO: 47, and SEQ ID NO: 48.

14. The fusion protein of claim 13, wherein the Cas12a domain is catalytically inactive and selected from the group comprised of SEQ ID NO: 3, SEQ ID NO: 6, and SEQ ID NO: 22.

15. The fusion protein of claim 1, wherein the first linker sequence comprises GGGGS repeated at least three times.

16. The fusion protein of claim 15, wherein the first linker sequence comprises GGGGS repeated at least six times.

17. The fusion protein of claims 1–16, wherein the fusion protein comprises the sequence selected from the group consisting of SEQ ID NO: 11, 12, 13, and 44.

18. The fusion protein of claims 1–17, further comprising a uracil DNA glycosylase inhibitor ("UGI") domain.

19. The fusion protein of claim 18, wherein the UGI domain comprises SEQ ID NO: 8.

20. The fusion protein of claim 19, wherein the UGI domain is linked to the Cas12a enzyme by a second linker comprising the sequence SGGS.

~~The fusion protein of claim 1, wherein the fusion protein comprises a sequence selected from the group consisting of SEQ ID NO: 17, SEQ ID NO: 24, SEQ ID NO: 35, SEQ ID NO: 39, SEQ ID NO: 43, SEQ ID NO: 50, SEQ ID NO: 52, SEQ ID NO: 54, SEQ ID NO: 56, SEQ ID NO: 81, SEQ ID NO: 83, SEQ ID NO: 85, SEQ ID NO:87, and SEQ ID NO:89~~.

~~The fusion protein of claim 1, wherein the fusion protein when contacted with DNA produces on-target edits at an increased frequency and off-target edits at a reduced~~

~~frequency compared to a fusion protein having a first linker sequence other than a repeated GGGGS sequence~~.

21. A method of editing plant genomic DNA, the method comprising contacting plant genomic DNA with:

    (a) the fusion protein of claims 1–17~~8 and optionally comprising a UGI domain~~; and

    (b) a guide RNA ("gRNA") targeting the fusion protein of step (a) to a target DNA sequence of the plant genomic DNA;

    wherein the edited plant genomic DNA comprises reduced off-target edits compared to plant genomic DNA edited by a fusion protein having a first linker other than a repeated GGGGS sequence.

22. The fusion protein of claim 21, wherein the fusion protein may comprise a UGI domain.

23. A method of editing plant genomic DNA with reduced off-target edits, the method comprising contacting plant genomic DNA with:

    (a) the fusion protein ~~of claims 1–17~~comprising SEQ ID NO: 24 ~~and optionally comprising a UGI domain~~; and

    (b) a guide RNA ("gRNA") targeting the fusion protein of step (a) to a target DNA sequence of the plant genomic DNA;

    wherein the edited plant genomic DNA comprises reduced off-target edits compared to plant genomic DNA edited by a fusion protein having a first linker other than a repeated GGGGS sequence.

24. The fusion protein of claim 23, wherein the fusion protein may comprise a UGI domain.

~~25. The method of claim 24, wherein the fusion protein comprises SEQ ID NO: 24.~~

~~26.~~25. A method of obtaining a population of edited plants with reduced off-target edits, the method comprising:

    (a) obtaining a population of plant cells comprising genomic DNA to be edited;

    (b) obtaining a nucleotide sequence encoding for a fusion protein selected from the group consisting of SEQ ID NO: 17, SEQ ID NO: 24, SEQ ID NO: 35, SEQ ID NO: 39, SEQ ID NO: 43, SEQ ID NO: 50, SEQ ID NO: 52, SEQ ID NO: 54,

SEQ ID NO: 56, SEQ ID NO: 81, SEQ ID NO: 85, SEQ ID NO:87, and SEQ ID NO:89 ~~the fusion protein of claims 1–16 and optionally a UGI domain~~;

(c) transforming the population of plant cells with the nucleotide sequence of step (b), thereby expressing the fusion protein encoded by the nucleic acid sequence within the population of plant cells;

(d) growing the transformed population of plant cells into plants, wherein at least one of the plants is edited; and

(e) selecting the at least one edited plant from the product of step (d), thereby obtaining a population of edited plants;

wherein the population of edited plants comprises reduced off-target edits compared to plants edited by a fusion protein having a first linker other than a repeated GGGGS sequence.

~~27.~~26. The fusion protein of claim 25, wherein the fusion protein may comprise a UGI domain.

~~28. The method of claim 26, wherein the nucleotide sequence encodes for a fusion protein selected from the group consisting of SEQ ID NO: 17, SEQ ID NO: 24, SEQ ID NO: 35, SEQ ID NO: 39, SEQ ID NO: 43, SEQ ID NO: 50, SEQ ID NO: 52, SEQ ID NO: 54, SEQ ID NO: 56, SEQ ID NO: 81, SEQ ID NO: 83, SEQ ID NO: 85, SEQ ID NO:87, and SEQ ID NO:89.~~