

# GEPHE SUMMARY

	Gephebase Gene	GephelD
PSST ( <a href="https://www.gephebase.org/search-criteria?/and+Gene">https://www.gephebase.org/search-criteria?/and+Gene</a> Gephebase=^PSST^#gephebase-summary-title)	GP00002636	Main curator
Published	Entry Status	Courtier

## PHENOTYPIC CHANGE

Trait Category		Trait	
Physiology ( <a href="https://www.gephebase.org/search-criteria?/and+Trait">https://www.gephebase.org/search-criteria?/and+Trait</a> Category=^Physiology^#gephebase-summary-title)			
Xenobiotic resistance (METI-I acaricide) ( <a href="https://www.gephebase.org/search-criteria?/and+Trait=^Xenobiotic+resistance+(METI-I+acaricide)^#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Trait=^Xenobiotic+resistance+(METI-I+acaricide)^#gephebase-summary-title</a> )		Trait State in Taxon A	
Panonychus citri - sensitive		Trait State in Taxon B	
Panonychus citri - resistant from Iran		Ancestral State	
Taxon A		Taxonomic Status	
Intraspecific ( <a href="https://www.gephebase.org/search-criteria?/and+Taxonomic">https://www.gephebase.org/search-criteria?/and+Taxonomic</a> Status=^Intraspecific^#gephebase-summary-title)			
Taxon A	Latin Name	Taxon B	Latin Name
Panonychus citri ( <a href="https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=^Panonychus+citri^#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=^Panonychus+citri^#gephebase-summary-title</a> )		Panonychus citri ( <a href="https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=^Panonychus+citri^#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=^Panonychus+citri^#gephebase-summary-title</a> )	
citrus red mite	Common Name	citrus red mite	Common Name
citrus red mite; citrus fruit mite; Panonychus citri (McGregor, 1916); Panonnychus citri	Synonyms	citrus red mite; citrus fruit mite; Panonychus citri (McGregor, 1916); Panonnychus citri	Synonyms
species	Rank	species	Rank
	Lineage		Lineage
cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Protostomia; Ecdysozoa; Panarthropoda; Arthropoda; Chelicerata; Arachnida; Acari; Acariformes; Trombidiformes; Prostigmata; Eleutherengona; Raphignathae; Tetranychoidea; Tetranychidae; Panonychus		cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Protostomia; Ecdysozoa; Panarthropoda; Arthropoda; Chelicerata; Arachnida; Acari; Acariformes; Trombidiformes; Prostigmata; Eleutherengona; Raphignathae; Tetranychoidea; Tetranychidae; Panonychus	
Panonychus () - (Rank: genus) ( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 50022">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 50022</a> )	Parent	Panonychus () - (Rank: genus) ( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 50022">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 50022</a> )	Parent
50023 ( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 50023">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 50023</a> )	NCBI Taxonomy ID	50023 ( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 50023">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 50023</a> )	NCBI Taxonomy ID
No	is Taxon A an Infraspecies?	No	is Taxon B an Infraspecies?

## GENOTYPIC CHANGE

ND-20	Generic Gene Name	UniProtKB Drosophila melanogaster
	Synonyms	GenebankID or UniProtKB
20 kDa; CG9172; Dmel\CG9172; Dmel\_CG9172; dNDUFS7; dNDUFS7A; ND20; NUKM; PSST		0
7227.FBpp0073949 ( <a href="http://string-db.org/newstring_cgi/show_network_section.pl?identifier= 7227.FBpp0073949">http://string-db.org/newstring_cgi/show_network_section.pl?identifier= 7227.FBpp0073949</a> )	String	
Belongs to the complex I 20 kDa subunit family.	Sequence Similarities	
	GO - Molecular Function	
GO:0046872 : metal ion binding ( <a href="https://www.ebi.ac.uk/QuickGO/term/GO:0046872">https://www.ebi.ac.uk/QuickGO/term/GO:0046872</a> )		
GO:0048038 : quinone binding ( <a href="https://www.ebi.ac.uk/QuickGO/term/GO:0048038">https://www.ebi.ac.uk/QuickGO/term/GO:0048038</a> )		
GO:0051539 : 4 iron, 4 sulfur cluster binding ( <a href="https://www.ebi.ac.uk/QuickGO/term/GO:0051539">https://www.ebi.ac.uk/QuickGO/term/GO:0051539</a> )		
GO:0008137 : NADH dehydrogenase (ubiquinone) activity ( <a href="https://www.ebi.ac.uk/QuickGO/term/GO:0008137">https://www.ebi.ac.uk/QuickGO/term/GO:0008137</a> )		

## GO - Biological Process

GO:0000302 : response to reactive oxygen species  
 (<https://www.ebi.ac.uk/QuickGO/term/GO:0000302>)  
 GO:0008340 : determination of adult lifespan  
 (<https://www.ebi.ac.uk/QuickGO/term/GO:0008340>)  
 GO:2000331 : regulation of terminal button organization  
 (<https://www.ebi.ac.uk/QuickGO/term/GO:2000331>)  
 GO:0009060 : aerobic respiration (<https://www.ebi.ac.uk/QuickGO/term/GO:0009060>)  
 GO:0015990 : electron transport coupled proton transport  
 (<https://www.ebi.ac.uk/QuickGO/term/GO:0015990>)  
 GO:0032981 : mitochondrial respiratory chain complex I assembly  
 (<https://www.ebi.ac.uk/QuickGO/term/GO:0032981>)

## GO - Cellular Component

GO:0005747 : mitochondrial respiratory chain complex I  
 (<https://www.ebi.ac.uk/QuickGO/term/GO:0005747>)

Presumptive Null

No (<https://www.gephebase.org/search-criteria?/and+Presumptive+Null=%No%#gephebase-summary-title>)

Molecular Type

Coding (<https://www.gephebase.org/search-criteria?/and+Molecular+Type=%Coding%#gephebase-summary-title>)

Aberration Type

SNP (<https://www.gephebase.org/search-criteria?/and+Aberration+Type=%SNP%#gephebase-summary-title>)

SNP Coding Change

Nonsynonymous

Molecular Details of the Mutation

H92R

Experimental Evidence

Candidate Gene (<https://www.gephebase.org/search-criteria?/and+Experimental+Evidence=%Candidate+Gene%#gephebase-summary-title>)

	Taxon A	Taxon B	Position
Codon	-	-	-
Amino-acid	His	Arg	92

## Main Reference

Molecular and genetic analysis of resistance to METI-I acaricides in Iranian populations of the citrus red mite *Panonychus citri*. (2020) (<https://pubmed.ncbi.nlm.nih.gov/32284140>)

Authors

Alavijeh ES; Khajehali J; Snoeck S; Panteleri R; Ghadamyari M; Jonckheere W; Bajda S; Saalwaechter C; Geibel S; Douris V; Vontas J; Van Leeuwen T; Dermauw W

Abstract

The citrus red mite, *Panonychus citri*, is a major pest on citrus all around the world. Mitochondrial Electron Transport Inhibitors of complex I (METI-I) acaricides such as fenpyroximate have been used extensively to control *P. citri* populations, which resulted in multiple reports of METI-I resistant populations in the field. In this study, biochemical and molecular mechanisms of fenpyroximate resistance were investigated in *P. citri*. Seven populations were collected from Northern provinces of Iran. Resistance ratios were determined and reached up to 75-fold in comparison to a fenpyroximate susceptible population. Cross-resistance to two additional METI-I acaricides, pyridaben and tebufenpyrad, was detected. PBO synergism experiments, *in vivo* enzyme assays and gene expression analysis suggest a minor involvement of cytochrome P450 monooxygenases in fenpyroximate resistance, which is in contrast with many reported cases for the closely related *Tetranychus urticae*. Next, we determined the frequency of a well-known mutation in the target-site of METI-Is, the PSST subunit, associated with METI-I resistance. Indeed, the H92R substitution was detected in a highly fenpyroximate resistant *P. citri* population. Additionally, a new amino acid substitution at a conserved site in the PSST subunit was detected, A94V, with higher allele frequencies in a moderately resistant population. Marker-assisted back-crossing in a susceptible background confirmed the potential involvement of the newly discovered A94V mutation in fenpyroximate resistance. However, introduction of the A94V mutation in the PSST homologue of *D. melanogaster* using CRISPR-Cas9 did not result in fenpyroximate resistant flies. In addition, differences in binding curves between METI-Is and complex I measured directly, in isolated transgenic and wildtype mitochondria preparations, could not be found.

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Additional References

## RELATED GEPHE

## Related Genes

1 (cytochrome b) (<https://www.gephebase.org/search-criteria?/or+Taxon+ID=%50023%/and+Trait=Xenobiotic+resistance/and+groupHaplotypes=true#gephebase-summary-title>)

Related Haplotypes

No matches found.

## EXTERNAL LINKS

## COMMENTS

