Electronic Supplementary Material (ESI) for RSC Advances.

Supporting information

Discovery of novel inhibitors of RNA silencing suppressor P19 based on virtual screening

Fan Hu,[ab†] Rong Lei,[b†] Yufang Deng,[ab] Jun Wang,[b] Guifen Li,[b] Chaonan Wang,[ab]

Zhihong Li,[a] Shuifang Zhu[ab*]

[a]*College of Plant Protection, China Agricultural University, Beijing, 100193, China. E-mail: zhusf@caiq.gov.cn*
[b]*Institute of Plant Quarantine, Chinese Academy of Inspection and Quarantine, Beijing, 100029, China.*
† These authors contributed equally to this study.

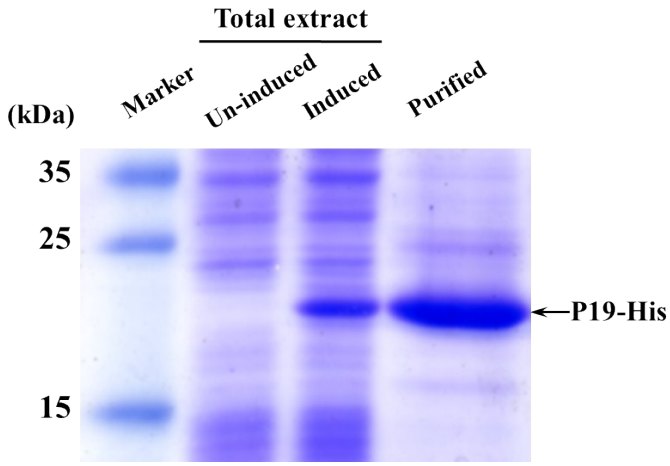


Fig. S1 The result of purification of RSS P19

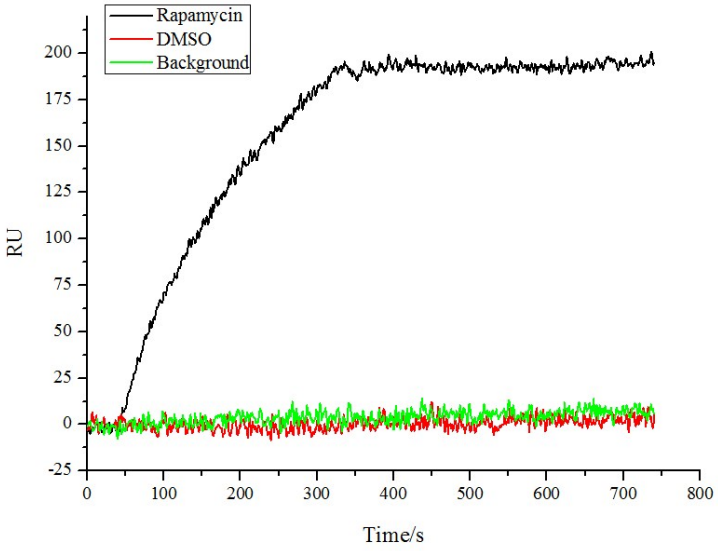


Fig. S2 SPRi response of negative and positive control in the prepared PCL chip. Interaction of rapamycin with protein FKPB12 was taken as positive control and DMSO was used as negative control.

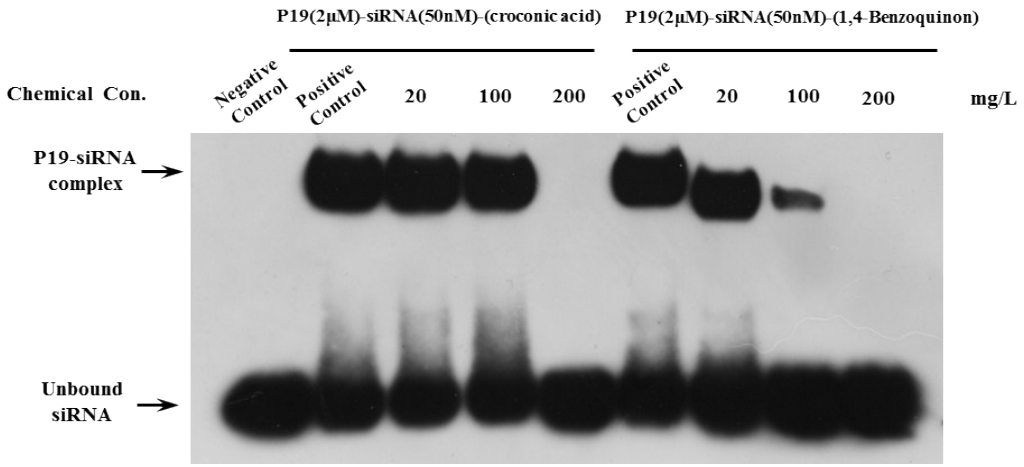
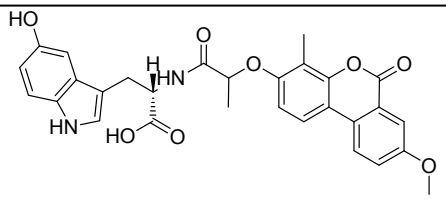
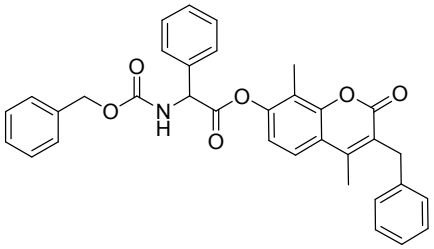
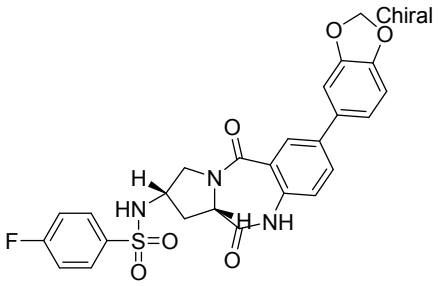
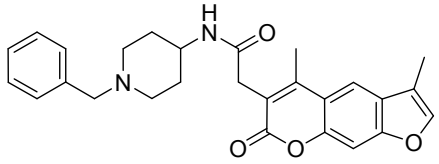
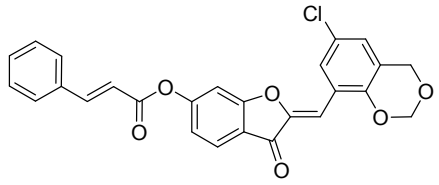
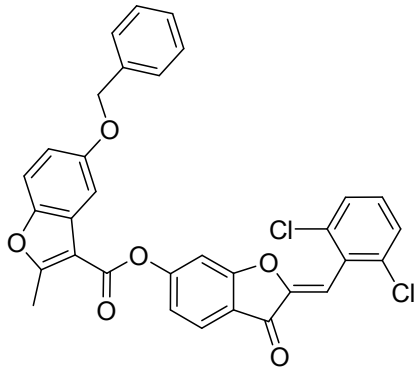
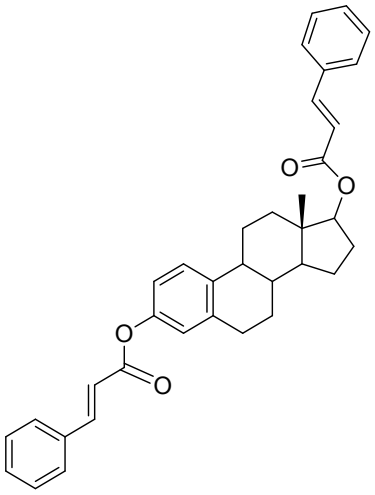
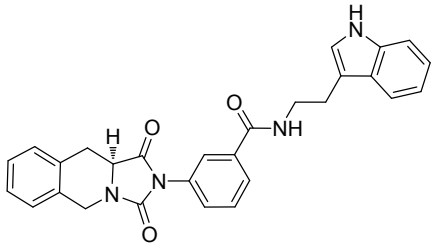
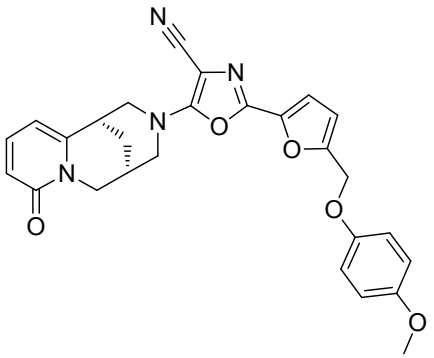
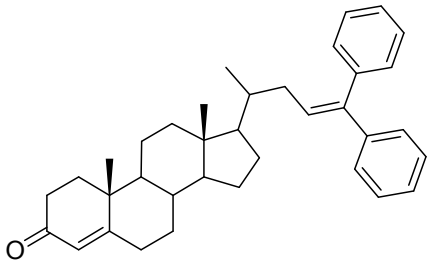
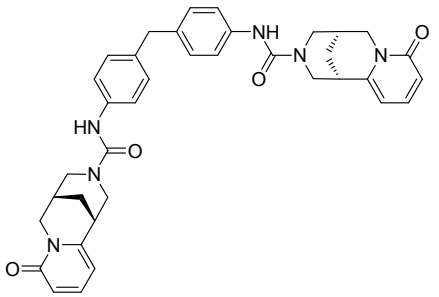
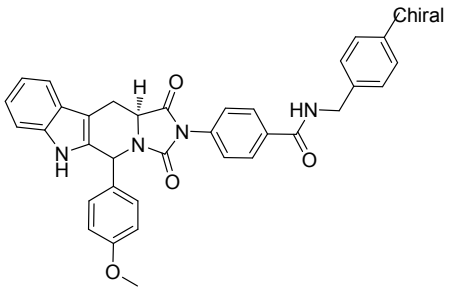
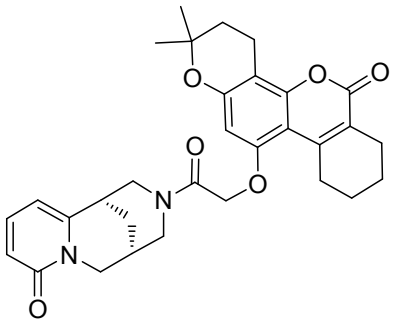


Fig. S3 Effects of known inhibitors on the association between P19 and siRNA in EMSA. Croconic acid (left) and 1,4-benzoquinon(right).

Table S1. Detailed information of selected 18 potential candidate inhibitors for P19.

NO.	Molecular formula	Structural formula	Binding affinity (kcal/mol)
VS1	$C_{29}H_{26}N_2O_8$		-8.7
VS2	$C_{34}H_{29}NO_6$		-10.2
VS3	$C_{25}H_{20}FN_3O_6S$		-9.8

VS4	$C_{27}H_{28}N_2O_4$		-9.8
VS5	$C_{26}H_{17}ClO_6$		-9.8
VS6	$C_{32}H_{20}Cl_2O_6$		-10.5
VS7	$C_{36}H_{36}O_4$		-10.2
VS8	$C_{25}H_{19}NO_6$		-8.9

VS9	$C_{27}H_{24}N_4O_5$		-9.8
VS10	$C_{36}H_{44}O$		-10.3
VS11	$C_{37}H_{38}N_6O_4$		-10.6
VS12	$C_{35}H_{30}N_4O_4$		-9.9
VS13	$C_{27}H_{28}N_2O_4$		-8.8

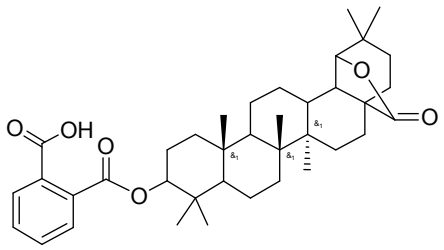
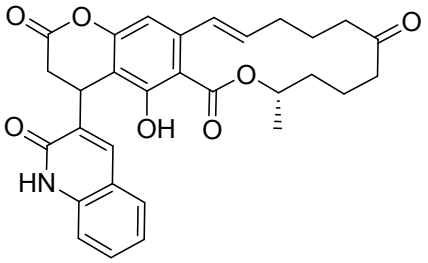
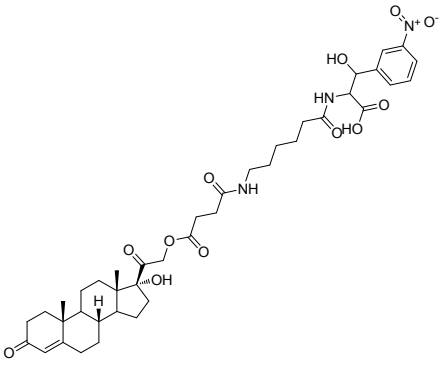
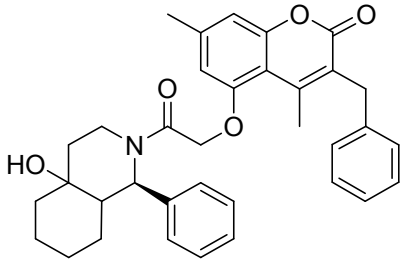
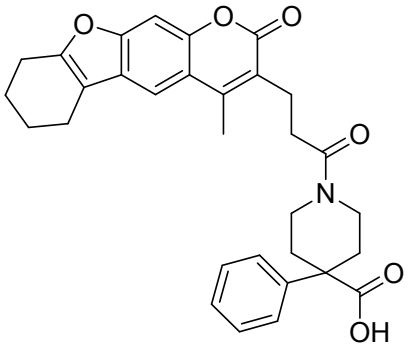
VS14	$C_{38}H_{52}O_6$		-9.9
VS15	$C_{30}H_{29}NO_7$		-9.8
VS16	$C_{40}H_{53}N_3O_{12}$		-9.8
VS17	$C_{28}H_{24}N_4O_3$		-10.2
VS18	$C_{31}H_{31}NO_6$		-10.0

Table S2. Primers used in this study.

Primer	Sequences
P19-Nde I	GGTTCCATATGTAAATGGAACGAGC
P19-Not I	ATAATGCGGCCGCCTCGCTTTCTT
TBSV-p33-F	TCCATACCAATCATACCGCTGTT
TBSV-p33-R	AGGCACCCTGACATTGAACG
EF1α-F	TGAGATGCACCACGAAGCTC
EF1α-R	CCAACATTGTCACCAGGAAGTG
CSK-21nt-siRNA	CUACCGCAUCAUGUACCAUdTdT

Table S3. The corresponding residues in 4JGN (right) to the analyzed key residues in 1RPU (left).

Analyzed key residues in 1RPU	Corresponding residues in 4JGN
P37, W39, T40, W42, R43,	PRO15, TRP17, THR18, TRP20, ARG21,
K60, S62, K67, K71, R72,	LYS38, SER40, LYS45, LYS49, ARG50,
R75, R78, R85, Q107, C110,	ARG53, ARG56, ARG63, GLN85, CYS88,
S113, R115, S120, S124, C134	SER91, ARG93, SER98, SER102, CYS112

Table S4. The interactions between P19 and the selected 18 compounds.

NO.	ZINC ID	The interactions with key residues in P19
VS1	ZINC02133552	Pi-pi: TRP20; H-bond: TRP17, LYS38, PRO15, SER40
VS2	ZINC02151632	Pi-pi: TRP20; H-bond: LYS38, TYR51
VS3	ZINC08299378	Pi-pi: TRP20; H-bond: PRO15, ARG93, SER14

VS4	ZINC08790043	Pi-pi: TRP20; H-bond: ARG50, SER91
VS5	ZINC09047550	Stacking: TRP20; H-bond: LYS38, TYR51, GLY96
VS6	ZINC11869098	Stacking: TRP20; H-bond: LYS38, TYR51
VS7	ZINC12657064	Stacking: TRP20; H-bond: TRP20, SER14, TYR51
VS8	ZINC12902247	Pi-pi: TRP17; H-bond: TRP17, SER14
VS9	ZINC32124314	Stacking: TRP20; H-bond: LYS38, ARG93, TYR51
VS10	ZINC35361023	Pi-pi: TRP20; Stacking: TRP20; H-bond: LYS38
VS11	ZINC70665805	Stacking: TRP20; H-bond: TRP20, LYS38, SER14
VS12	ZINC70705440	Pi-pi: TRP20; Stacking: TRP20; H-bond: LYS38, ARG50
VS13	ZINC08790043	Pi-pi: TRP20; H-bond: TRP17, LYS38
VS14	ZINC72332803	Pi-pi: TRP20; H-bond:TRP17, LYS49, PRO15
VS15	ZINC79192430	Pi-pi: TRP20; H-bond: TRP17, PRO15, SER14, TYR51
VS16	ZINC85907391	Stacking: TRP17, TRP20; H-bond: TRP17, LYS38, PRO15, SER91, TYR51

VS17	ZINC70687918	Pi-pi: TRP20; H-bond: TRP17, LYS38, ARG93
VS18	ZINC02104633	Pi-pi: TRP20; H-bond: PRO15, SER91, SER14